

The Iron Age

INDEX TO
READING MATTER
PAGE 36.

A Review of the Hardware, Iron and Metal Trades.

INDEX TO
ADVERTISEMENTS
PAGE 23.

Published every Thursday Morning by DAVID WILLIAMS, No. 83 Reade Street, New York. Entered at the Post Office, New York, as Second-Class Matter.

Vol. XXXVI: No. 23.

New York, Thursday, December 3, 1885.

\$4.50 a Year, Including Postage.
Single Copies, Ten Cents.

The Gordon Three-Pass Hot-Blast Stove.

From a paper read by Victor O. Strobel, of Pittsburgh, at the Chattanooga meeting of the American Institute of Mining Engineers, we take the following description of a new type of hot-blast stove recently designed by F. W. Gordon, a modification of the Whitwell-Cowper:

The gas is admitted through the valve L into the combustion chamber M, where it is thoroughly oxidized, passing up the chamber M, descending through the regenerative flues N into the chamber I, then ascending through the regenerative flues E and D, and directly to the atmosphere through the draft-stack A. In the four-pass stove this gas makes another downward turn, passing out of the chimney-valve into an underground flue to the draft-

This is a feature worthy of notice, for, after scraping and cleaning the walls in the regenerator N, the dust can be removed through a single door, H, the sides of which are flared, permitting easy access to any part of the space. Each of the 9-inch square flues in the last pass E of the regenerator is divided into four smaller flues, as shown at D, increasing the heating surface 90 per cent., but decreasing the area only 12½ per cent. The mass of material, however, is increased 22 per cent. The gas upon reaching this part of the regenerator has given up much of its heat; but, as the absorbing mass has been increased and the gas subdivided into four parts and brought into contact with nearly double the heating surface, a greater proportion of the heat is here taken up from the escaping gases. This reduction of area has a tendency to increase the loss of heat due to friction, but the flues in the lower part of

proportional would have exactly the same material in them as the above two, the cost would be almost identical.

When a very high temperature of blast is required an arrangement for the uniform heating of the whole regenerator is effected by passing a portion of the products of combustion into the chamber I, Fig. 1, under the regenerator carrying the maximum sensible heat. The temperature of the last pass of the regenerator can therefore be made equal to that of the first pass, the escaping gases passing off at a temperature of 1400° to 2000°, again illustrating how the entire mass of brickwork, equal to that in the Whitwell stove, is subjected to higher heats. This flow of gas from the combustion chamber is introduced through a port, in which a fire-brick plug will regulate the quantity of gas desired. The strong draft through the last pass of the regenerator

sequently the cleaning operation was postponed until in many cases the heating power of the stove was reduced to one-half its actual capacity. The device shown in the three-pass stove simplifies this operation, the whole time occupied in performing what formerly took from six to eight hours being about one hour.

Figs. 3 and 4 exhibit a general plan of a furnace with a plant of three-pass stoves. A A are the stoves, B is the furnace, C the overhead gas main to dust-catcher; D is the dust-catcher, which is used exclusively for the gas to be burned in the stoves. This we consider a highly important appurtenance to the stoves, and think it should in all cases be adopted.

I here wish to explain some of the details of valve construction in connection with hot-blast stoves. The hot-blast valve and gas valve in the ordinary four-pass Whitwell stove are frequently burned by premature combustion of the gases in the space between them, and must be replaced. When the stove is on gas this space, of course, forms the conduit to the combustion chamber, but the leakage of air blast through the valve immediately ignites the gas, and both are subjected to this intense flame. In the stove

before mentioned permitting sufficient movement and retaining a tight joint. This adjustment is compensated at the other end of the valve by the ball-jointed gland N. To replace a valve-seat merely necessitates the removal of the cap E and a manhole cap underneath this, through which the new seat may be adjusted. All the air for combustion is admitted through a single opening directly under the gas inlet to the stove, insuring a thorough mixture of the products. This air-valve, which is of the puppet form, is attached to a hinged door and also forms an opening in the bottom of the combustion chamber for the removal of dirt. The entire bottom of this chamber can be reached through this single door with great ease. The chimney-valve, placed in the bottom of the chimney on top of the stove, as shown in Fig. 3, is constructed in a similar manner, the hollow space in the valve seat being made doubly large to permit a strong current of air to pass through it for cooling. This current is established by the stove chimney. The same draft also serves to cool the large circular disk-valve.

The chimneys of these stoves are strongly built, commencing with heavy plate on the bottom and thinning at the top. They are lined

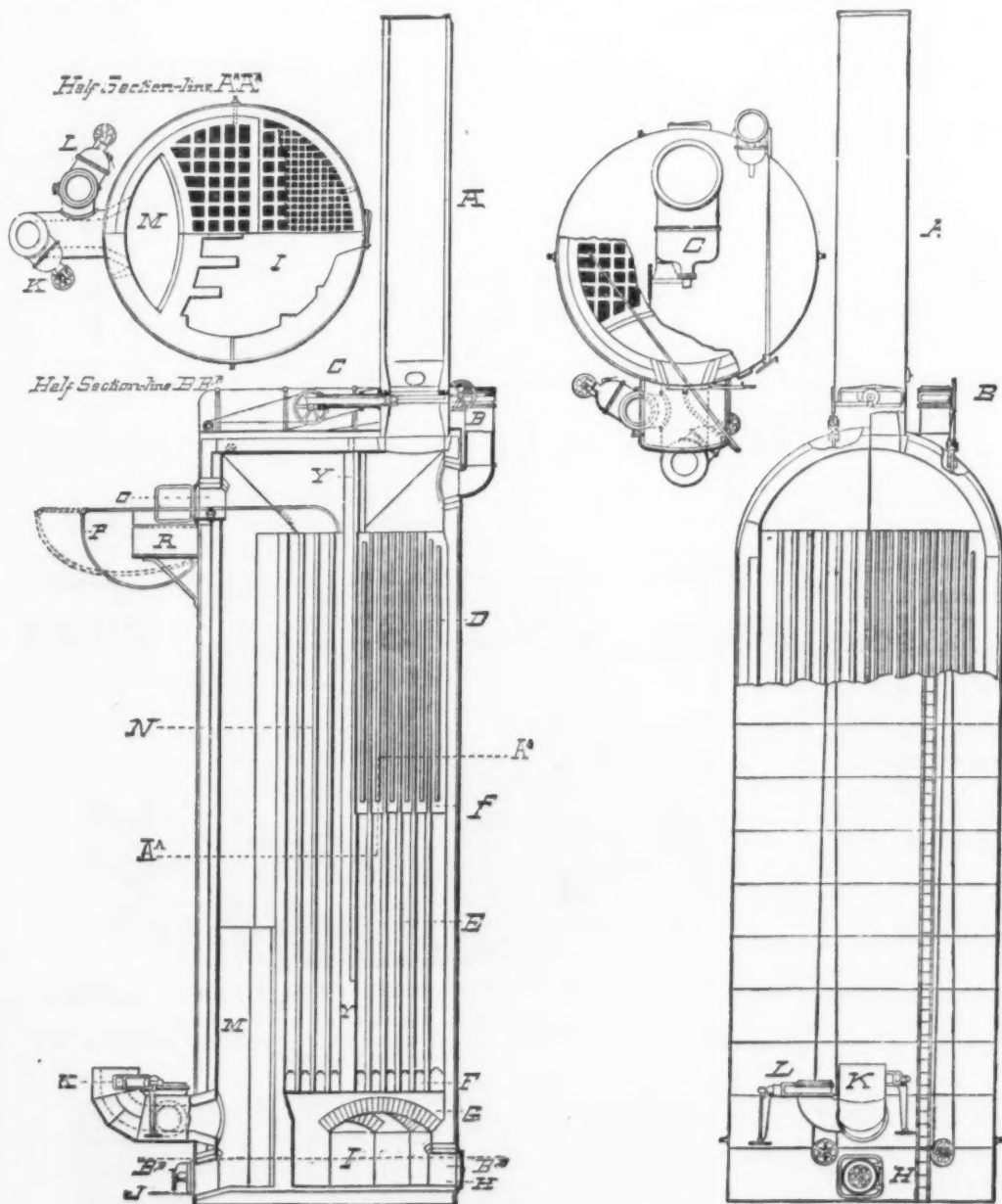


Fig. 1.—Vertical Section.

Fig. 2.—Side Elevation.

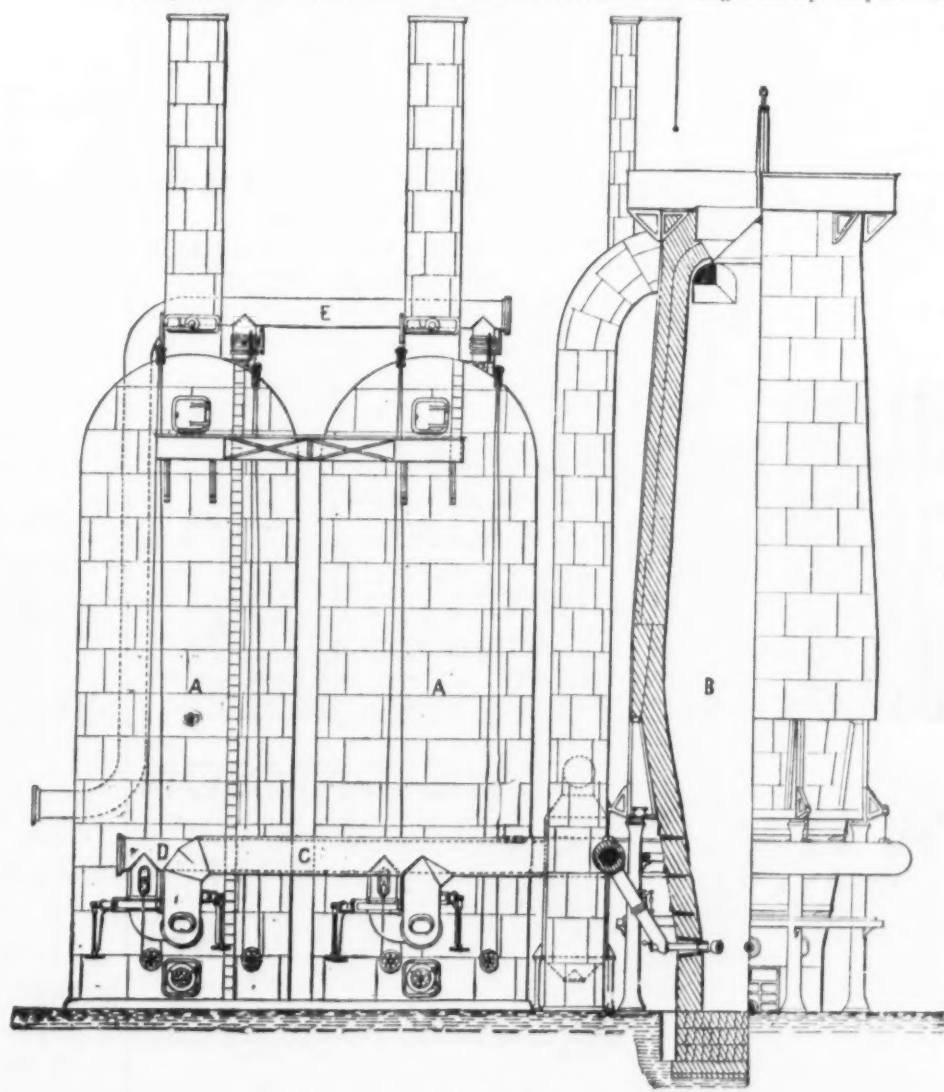


Fig. 3.—Elevation of Furnace Plant.

THE GORDON THREE-PASS HOT-BLAST STOVE.

stack at some remote point. In the three-pass stove the air-blast, taking a reverse direction, is admitted into the chamber X through the valve B, descending through the regenerative flues D and E into the chamber I, then ascending through the regenerative flues N, and descending again, passing out of the stove through the valve K. As tests have shown the temperature of the burning gas in the chamber N to be five times greater than that of the gas escaping into the chamber X, the division wall Y is subjected to much greater heats upon the one side than upon the other. In the four-pass stove this division wall is bonded into the regenerative-flue work of both passes. The different qualities of fire-brick in these passes, together with the difference in temperature to which they are subjected, has frequently broken this bond, resulting in the displacement of bricks in the flues, thereby causing a serious impediment to cleaning and to the flow of gases. In the three-pass stove, Figs. 1 and 2, this difficulty is avoided by splitting the division wall Y, thus virtually forming a stove in two longitudinal parts which are free to expand independent of each other. The bottom of this wall is bonded together, and as the linear expansion in this distance of 10 or 15 feet of brick is almost insignificant, owing to the slight difference in temperature, no objection can be made. It also serves to make a seal between the regenerators N and E when the gas is being transferred. This entire regenerative work is built upon a series of longitudinal arches G. The lintels F, upon which is built the checker-work, are supported upon these arches. By this disposition of arches the entire space under the regenerators is embodied in one.

the regenerator have been increased in area over the usual amount, thus compensating for the loss.

The stove shown in Figs. 1 and 2 is divided into three passes, increasing the area of each very considerably, and consequently permitting a much greater volume of gas to be passed through them in a given time. The resistance in the flow of gas due to the long, contracted areas of the four-pass system requires enormous underground flues and draft-stacks, and, since the gas in the last pass in these stoves rarely, if ever, exceeds the temperature of 500° F., the stove does not develop its maximum power. In the three-pass stove the gas will pass off at a temperature of 600° F., having previously imparted its heat to an absorbing mass equal to that of the four-pass stove. As I have previously stated, the subdivision of the flues D has increased the heating surface, giving in the aggregate 25 per cent. more. If the same volume of gas be passed through the increased areas of the three-pass stove, the draft requisite must be materially lessened, or the volume of gas may be increased until a like draft is attained. For instance, for a product of 200 tons of iron per day we propose two of the improved stoves, 23 feet in diameter by 60 feet high, one on blast and one on gas. It is required, according to our proposition, to pass 260 cubic feet of gas per second through the one which is being heated, so that it may have imparted to it as much heat as the two on gas in a plant of three Whitwells. Or we would introduce four stoves, two on gas and two on blast, having the same aggregate cross-section internal area as the two 23 x 60 stoves. This would be four 17 x 60 foot stoves. As these four stoves with valves

draws the products rapidly through, and takes from the current which usually passes up the combustion chamber a large portion of the dust, which is deposited in the chamber I, and can readily be removed through the cleaning-door H. It will be observed that this gas is taken from a point in the combustion chamber where a thorough mixture of the air and gas is to be had. Owing to the greatly increased volume and velocity of the gas passing through this stove, the tendency for accumulation of dirt will be materially reduced, the strong draft carrying most of the dirty gases with it. For cleaning the stoves a very simple device is used, consisting of an ordinary piece of gas-pipe, P, introduced through a single opening, O, at the top of the stove, and so located that each and every flue-hole in the first down-pass may be reached. In case the upper part of the regenerator becomes incrustated with dirt, a scraping-plate and plummet with the proper sheaves is substituted. The last two passes of regenerators very rarely, if ever, require cleaning, as the whole deposit seems to be concentrated in parts where the gases are highly rarified, which, in any stove, is invariably the first down-pass. This difficulty has been experienced by those who have used the Cowper stove.

Yet it is clearly demonstrated by practice that very little cleaning is necessary when the gases are passed through a dust-catcher. By the cleaning device, as shown in the four-pass stove, great difficulty is experienced in removing the material in the numerous holes through each of which only a few flues can be cleaned. This difficulty often proved to be the cause of poorly-working stoves. Much time was lost in removing these lids and the brick filling, and con-

exhibited in Figs. 1 and 2, the disposition of these valves is such that the products cannot come in contact with each other short of the stove combustion chamber. The hot-blast valve in this case, details of which are seen in Fig. 5, is of the gate type, and pierces the wrought-iron elbow in its vertical portion. The valve L, similar in construction to K, is bolted upon a cast iron elbow and engages the wrought-iron elbow in its horizontal portion on one side, close up to its connection with the stove shell. Any leakage in the valve K will therefore meet this gas at the point where it enters the conduit in the wrought-iron elbow, close up to the orifice to the combustion chamber, thereby securing the safety of both valves. The varying temperatures to which these valves are subjected make it a matter of extreme difficulty to avoid their warping and the destruction of the valve seats. The ordinary puppet-form hot-blast valve has given more or less trouble in this direction, and when a replacement of the seat was necessary the entire mass of brickwork above the seat had to be removed, entailing a great loss of time and work. The sliding hot-blast valve renders this operation, when necessary, quite simple. The valve shown in Fig. 4 presents several novel features. The seat A, Fig. 5, is a hollow phosphor-bronze casting, fitted into a ring C, with a slightly tapered or spherical joint. The body of the valve consists of a simple neck, riveted to the wrought-iron elbow and engaging the ring C on the bottom flange. The cap E is bolted to this neck. The gland N is fitted to this cap with a spherical joint. If, therefore, the valve-seat A should get out of line, adjustment can be effected with the keys, the spherical joint

with 4½ inches of fire-brick. The cold-blast valve B is an ordinary slide-gate valve operated with a rack and pinion. On the main valve an auxiliary or small valve is placed for the purpose of equalizing the pressure on both sides of the valve, lessening the power which would be required to move the large valve with the full pressure on. The chimney and cold-blast valves are operated from a common station at the bottom of the stove with ordinary wire ropes passing over grip-sheaves. The operation of changing a stove from gas to blast, or vice versa, is so simple that an ordinary laborer can attend to the operation of the stoves. The operating wheels are arranged in the order necessary to make the change. Beginning at the right, the cold-blast valve is closed. The next in regular order is the hot blast valve. Then the air-valve, chimney-valve and gas-valve are each opened in their respective order. This operation changing the stove from blast to gas, the reverse of it will change the stove from gas to blast.

In conclusion I give here a comparative exhibit of the cost of plants of these stoves, the Player 18-pipe hot-blast stove and the Whitwell fire brick stoves, capable of making a weekly product of 500 tons:

A plant of five 18-pipe Player hot-blast stoves would cost	\$22,000
A plant of two Whitwell	\$24,000
A plant of two Gordon's Improved	\$20,000

The foundation in all cases omitted. The item for the Player stoves would almost run their cost up to that of the Whitwell plant.

The stock in the new co-operative nail mill, at Bellville, Ill., has all been taken, and work on the erection of the mill will be begun at once.

ANSONIA BRASS AND COPPER CO.,
MANUFACTURERS OF
PURE COPPER WIRE,
For Electrical Purposes,
Bare and Covered,
O'NEIL'S PATENT PLANISHED
COPPER.
Seamless Brass and
Copper Tubing,
Sheets, Bolts, Rods,
Wire, O'Neil's
Patent Nickel-
Plated Copper,
&c.,
—IN—
W. E. DODGE,
Pres't.
G. F. COWLES,
V.-P. and Treas.
A. A. COWLES,
Secretary.
**ANSONIA Refined Ingot
Copper, Anchor Brand;**
LAKE INGOT COPPER.
19 & 21 Cliff Street,
NEW YORK.

PHELPS, DODGE & CO.,
IMPORTERS OF
TIN PLATE
Roofing Plate, Sheet Iron, Copper,
Pig Tin, Wire, Zinc, &c.
MANUFACTURERS OF
COPPER AND BRASS.
CLIFF STREET, NEW YORK.

(Established 1822.)
SCOVILL MFG. COMPANY
WATERBURY, CONN.,
Manufacturers of
BRASS—Sheet Brass, Brass Wire, Brass Tubing.
GERMAN SILVER—Sheet German Silver, German Silver Wire, German Silver Tubing.
BUTT HINGES—Narrow, Middle, Broad, Desk, Ship, Stop, Spring and Piano-Porte.
BUTTONS—Military, Naval, Livery, Society, Hall-road, School, Lasting, Silk and Dress.
LAMP GOODS—German Student Lamps, Kerosene Burners, Kerosene Lamps.
PHOTOGRAPHIC—Camera Boxes, Printing Frames, Chemicals, Paper, Glass, &c.
Scovill's Patent Lock Box for Post Offices.
DEPOTS:
473 Broome Street, New York.
177 Devonshire Street, Boston.
185 Lake Street, Chicago.

IRON ROOFING
SIDING, CEILING,
ARCHES AND LATH.
CINCINNATI
CORRUGATING CO.
CINCINNATI, O.
SEND FOR ILLUSTRATED CATALOGUE.

THE SAMSON
Is the Best, the Simple
and most Portable
WIRE STRETCHER
In the Market.
Line of Draft direct; always Self-Adjust-
ing; Rigid Double Handle; Double Pawl;
it works at either end of the fence, at either
side of the post and either side up.
LIGHT, PORTABLE, SIMPLE, SURE.
For sale by all leading wholesale Jobbing
Hardware Houses and Barb Wire men in the
United States.
MANUFACTURED ONLY BY
SAMSON NOVELTY WORKS Nos. 14 & 16 Main St., De Kalb, Ills.
AND IN CANADA BY
BULLOCK HARDWARE CO., Otterville, Ontario.

Iowa Barb Wire Co., 98 Reade Street,
New York.

ESTABLISHED 1837.
INCORPORATED 1876.
H. S. CHASE,
Sec'y & Treas.
Waterbury Mfg. Co.,
WATERBURY, CONN.,
Brass Goods

THE WIRE GOODS CO.,
Worcester, Mass.
Bright Wire Goods, Mill Wire Goods, Belt Hooks, Double-Pointed Tacks and Staples, Wire
Picture Cord, Clothes Line Wire, Hand Rail Screws, &c., &c. Wires cut, bent, milled, straightened
and made to any desired shape. Orders solicited from the Trade for the full line of Screw
Eyes, &c., known as Hardware Wire Goods. Quality guaranteed the best in the market.
Special articles made to order.
A. W. PARMELEE, Pres't.
THE WIRE GOODS CO., Worcester, Mass.

Waterbury Brass Co.
ESTABLISHED 1845.
Sheet, Roll and Platers' Brass,
German Silver, Copper, Brass and
German Silver Wire, Brass and
Copper Tubing,
Copper Rivets and Burs,
Brass Kettles, Door Rail, Brass Tags, Per-
cussion Caps, Powder Flasks, Metallic
Eyelets, Shot Pouches, Tape Meas-
ures, &c., and small Brass Wares
of every description.

**Cartridge Metal in Sheets or
Shells a Specialty.**
Sole Agents for the CAPEWELL MFG. CO.'S
Line of Sporting Goods.
DEPOTS: MILLS AT
296 Broadway, New York. WATERBURY,
125 Eddy St., Providence R. I. CONN.

THE
New Haven Copper Co.,
SOLE MAKERS OF
POLISHED COPPER
Under Patent of T. James, Sept. 12, 1876.
ALSO MANUFACTURERS AND
DEALERS IN

BRAZIERS' & SHEATHING COPPER
Kettles, Bottoms, Bolts, Circles, &c.
ALSO MANUFACTURERS OF
Cast Steel Angers and Bits of Superior Quality.
294 Pearl St., NEW YORK.
DICKERSON, VAN DUSEN & CO.
IMPORTERS OF
TIN PLATE, PIG TIN, SHEET IRON,
COPPER, WIRE, ZINC, ETC.,
29 and 31 Cliff St., cor. Fulton,
DICKERSON & CO., Liverpool. NEW YORK.

THE PLUME & ATWOOD MFG. CO.
MANUFACTURERS OF
Sheet and Roll Brass
AND
WIRE,
GERMAN SILVER AND GILDING METAL,
COPPER RIVETS AND BURS, COPPER
ELECTRICAL WIRE,
**Pins, Brass Butt Hinges, Jack
Chain, Kerosene Burners,
Lamp Trimmings, &c.**
18 MURRAY ST., NEW YORK,
71 PEARL ST., BOSTON,
115 LAKE ST., CHICAGO.

BRIDGEPORT BRASS CO.
MANUFACTURERS OF
Sheet and Roll Brass,
BRASS AND COPPER WIRE AND TUBING,
SEAMLESS AND BRAZED TUBING, COPPER
AND IRON RIVETS,
Oilers and Cuspidors, Lanterns and Trimmings,
Clocks and Fly Fan Movements, Lamps and
Trimmings, Kerosene Burners,
Plumbers' Materials.
Particular attention paid to cutting out Blanks
and manufacturing Metal Goods.
MANUFACTORY, BRIDGEPORT, CONN. | WAREHOUSE,
25 Park Place, | 19 Murray St., N. Y.

Holmes, Booth & Haydens,
WATERBURY CONN.
NEW YORK, BOSTON,
25 Park Place, 18 Federal St.
22 Murray St.
Manufacturers of all kinds of
Brass, Copper & German Silver,
ROLLED AND IN SHEETS.
Brass and Copper Wire, Tubing,
Copper Rivets and Burs.
BRASS AND IRON
JACK CHAIN, DOOR RAIL.
GERMAN SILVER SPOONS, SILVER-
PLATED FORKS AND SPOONS,
KEROSENE BURNERS, &c.

JOHN DAVOL & SONS,
AGENTS FOR
Brooklyn Brass & Copper Co.,
DEALERS IN
Ingot Copper, Spelter, Lead, Tin,
Antimony, Solder & Old Metals,
100 John Street, New York.

PASSAIC ZINC CO.
MANUFACTURERS OF
Pure Spelter
FOR
Cartridge Brass, Gas Fixtures, Bronzes
AND ALL FINE WORK.
Also for
GALVANIZERS AND BRASS FOUNDERS.
MANNING & SQUIER, Gen'l Agents,
111 LIBERTY ST., (2d Floor), NEW YORK.

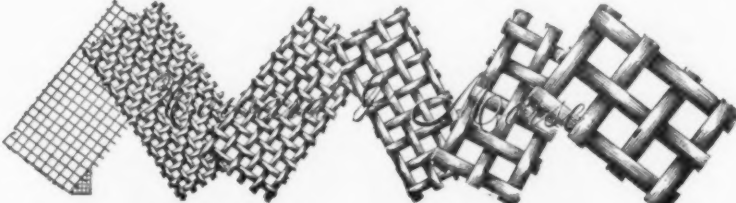
GEO. W. PRENTISS & CO.,
HOLYOKE, MASS.
Manufacturers of
IRON WIRE,
Bright, Coppered, Annealed and Tin Plated. Also
GUN SCREW WIRE
Of all sizes, straightened and cut to order.

OLD COLONY RIVET CO.
MINISTON, MASS.
TINNERS AND ALL OTHER
NORWAY IRON
1/4 IN. DIAM. & SMALLER.
ALL LENGTHS & STYLES.

HOLT'S FORGES.
FIVE SIZES.
FOR ALL KINDS OF WORK.
\$10 and Upward.
HOLT MFG. CO.,
Cleveland, Ohio.
Mention The Iron Age.

PHILIP L. MOEN, President and Treasurer. CHAS. F. WASHBURN, Vice-President and Secretary.
WASHBURN & MOEN MANUF'G CO.,
Established 1831. WORCESTER, MASS.


MANUFACTURERS OF
IRON and STEEL WIRE,
Patent Steel Barb Fencing, Patent Steel Wire Bale Ties.
WIRE RODS of all Grades: Round Iron, Rivet quality, 3/16 in. to 1 1/2 in., cut to any length. Owners and ex-
clusive Operators of the PATENT CONTINUOUS ROLLING MILL, producing Iron and Steel WIRE
in coils of 100 pounds, without seam or weld. Patent Galvanized Telegraph Wire, Market and Stone
Wire, Annealed Fence and Grape Wire in long lengths; Coppered Rail-Ball Wire; Rope, Bridge, Bolt, Screw,
Rivet, Buckle and Chain Wire. Wire for the manufacture of Card Clothing, Heddles, Reeds, &c. Piano-string
Covering Wire, Tinned Broom Wire and Tinned-plated Wire of all sizes. A specialty is made of Clock, Machin-
ery, Gun Screw and Spiral Spring Wire, and Bednet Wire to Pattern for particular purposes. From selected
stamps of Norway Iron. Any grade of Wire furnished. Annealed, Bright, Polished, Coppered, Galvanized or
Tin Plated. Wire furnished, straightened and cut to any length. Steel Crinoline Wire, Patent Line
Rope, Unriveted Steel Music Wire. Steel Wire for springs, No. 10's and Drills. Market Steel Wire
kept in stock, all sizes.
WAREHOUSES: New York, 16 Cliff and 241 Pearl Sts.
Chicago, 107 and 109 Lake St.

Iron, Coal and Copper Mines
SUPPLIED WITH

WIRE CLOTH
OF ALL KINDS
BY
HOWARD & MORSE,
45 FULTON STREET, NEW YORK.

ABRAM S. HEWITT, Pres., WM. HEWITT, Vice-Pres., JAMES HALL, Treas., E. HANSON, Sec.
THE TRENTON IRON CO.,
MANUFACTURERS OF
IRON AND STEEL WIRE.


Plans and Estimates for Suspension Bridges Furnished on Application.
Works and Office, TRENTON, NEW JERSEY.
New York Office, COOPER, HEWITT & CO., 17 Barling Slip. Philadelphia Office, 21 N. Fourth St.
Chicago Office, 146 Lake Street.

WIRE ROPE
HAZARD MFG CO
WAREHOUSES: 87 Liberty St., New York. Wilkesbarre, Pa. WORKS:


Broderick & Bascom Rope Co.,
WIRE ROPE
BRODERICK & BASCOM ROPE CO.
MANUFACTURERS OF IRON AND STEEL

WIRE ROPE,
704 & 706 N. Main St., - - - St. Louis, Mo.
A. LESCHEN & SONS,
Manufacturers of
WIRE ROPE
Hemp Packing,
Twines.
903 and 905 N. MAIN STREET, ST. LOUIS, MO. Correspondence invited.

W. S. ESTEY,
Manufacturer of
WIRE CLOTHS
Of Brass, Copper,
Iron, Galvanized
& Steel Wire, of all
Meshes & Grades.
Iron and Steel Locomotive Spark Wire Cloth. Riddles for Export and Foundry use. Coal
and Sand Screens. Iron Bolting Cloth. Wire Work of every description.
No. 71, FULTON ST., - NEW YORK.

O. LINDEMANN & CO.
Manufacturers of
Japanned, Brass,
Tin Plated
and Wood
**BIRD
CAGES.**
Original inventors
and patentees of
Bright Metal Cages
constructed without
solder.
254 Pearl St.,
NEW YORK.

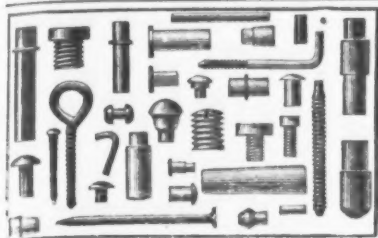


CARY & MOEN,
MANUFACTURERS
STEEL WIRE for all purposes and STEEL SPRINGS of every description.

Market Steel Wire, Crinoline Wire, Tempered and Covered.
Also PATENT TEMPERED STEEL FURNITURE SPRINGS, constantly on hand.
234, 236 and 238 West 29th Street, NEW YORK.

THE FRED. J. MEYERS MFG. CO.,
COVINGTON, KY., Manufacturers of
WIRE GOODS OF ALL KINDS.

"SHARP'S" PAT. CAN OPENER.
This is the easiest and most rapid cutting Can Opener ever made. It can be used to open either round or square cans. By turning with the fingers the small ratchet on the end of the screw or spiral rod, the Knife or Cutter can be set to cut a hole any size, from 1/8 in. to 1 1/2 in. in diameter. The Knife is made of the finest forged and tempered steel, and on account of its peculiar construction will cut the heaviest as well as the lightest can. The Spiral Screw, as well as the Stick on the end, are also made of steel, and the whole device finished first class in every respect, making this, without question, the simplest, most durable and best Can Opener ever introduced.
Our patent Oval Popper with round corners is the neatest, strongest and best Popper made. Dealers desiring a first-class article should buy no other. Wrought-Iron Fencing, Cresting, Mining Knives and Hardware Specialties. Send for Illustrated Catalogue and Price List.





IRON AND BRASS RIVETS,
STUDS, PINS, SCREWS, &c.
For Manufacturers of Light Hardware.
BLAKE & JOHNSON, WATERBURY, CONN.

W. S. TYLER
WIRE WORKS CO.
SUCCESSORS TO W. S. TYLER,
MANUFACTURERS OF
EXTRA HEAVY STEEL WIRE CLOTH
FOR STAMP BATTERIES.
Steel, Iron, Brass and Copper Cloth for Coal and Ore
Screens, Flour Mills, Paper Mills and Millstems.
754 to 758 ST. CLAIR ST.
W. S. TYLER, Pres. E. H. ALLEN, Sec. & Treas.
CLEVELAND, OHIO.

SPRINGS.

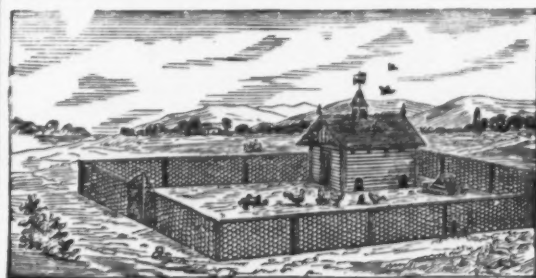


Elliptic, Concord, Platform and all standard shapes made from the celebrated PERNOT CAST STEEL by the Gautier Steel Department of the Cambria Iron Co., Johnstown, Pa. All springs are hand-fitted, thoroughly tested under power presses, and carefully inspected before leaving the factory.

New York Office,
104 READE ST.

Chicago Office,
202 First Nat. Bank Building.
[No. 136.]

Philadelphia Office,
523 ARCH ST.



Estab'd 1818. Incorp'd 1875.
**THE
Gilbert & Bennett Mfg. Co.**
WAREHOUSES:
42 CLIFF ST., NEW YORK,
238 LAKE ST., CHICAGO, ILL.
MANUFACTURERS OF
Iron & Galvanized Wire
Sieves and Wire Cloth.
Power Loom Painted and Galvan-
ized Window Screen Wire Cloth.
Galvanized Wire Cloth for Drying
Fruits, World's Galvanized Web
Wire Fence, Galvanized Twine
Wire Fencing Netting.
Factories, Georgetown, Conn.

NIEN-TSI CHINESE LACQUER,

Manufactured by ALBERT ASSMAN & SONS.
UNEQUALLED FOR DURABILITY. Prevents Iron, Steel, Brass, Nickel, Copper, Silver, Bronze and all compositions from corroding. Also resists dampness, KEROSENE OIL and FLY SPECKS. Can be applied without heating metal.

Sole Agents, **H. S. ALLEN & CO., 112 John St., New York.**

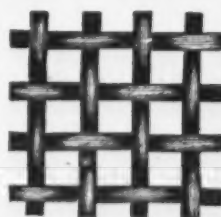
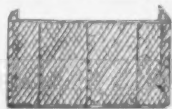
Would call special attention to manufacturers of Agricultural Implements, Machinery and Architectural Iron Works. Sample and Prices sent on application.

PENNSYLVANIA WIRE WORKS,
231 Arch Street. PHILADELPHIA.

EDWARD DARBY & SONS,
MANUFACTURERS OF

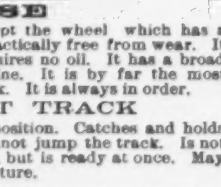
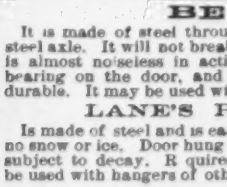
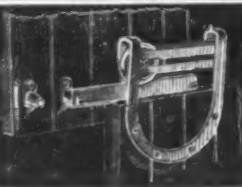
Brass, Copper & Iron Wire Cloth, Sieves & Riddles.

Extra-Heavy and Twilled Locomotive Wire, Brass Wire Cloth for Centrifugal Machines, Wrought-Iron Railings, Coal and Sand Screens, Iron Bedsteads, Wire Window Guards, Wire Work of Every Description. Send for Catalogue.



LANE'S PATENT STEEL DOOR HANGER.

The most perfect Anti-Friction Hanger in the Market.



Manufactured by **LANE BROS., Poughkeepsie, N. Y.**

JOHN H. GRAHAM & CO., General Agents, 113 Chambers Street, NEW YORK.

DIEBEL MANUFACTURING CO.

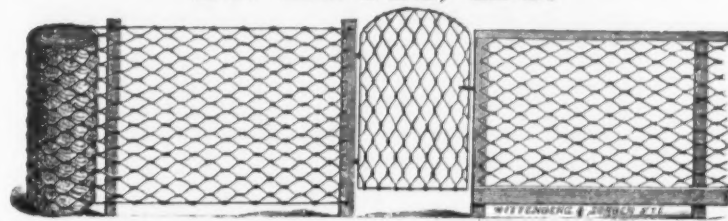
N. E. Cor. 3d and Cumberland Sts., PHILADELPHIA, PA.,

MANUFACTURERS OF THE
CHALLENGE EMERY GRINDERS, POLISHING MACHINES, COUNTER SHAFTS, HANGERS, &c.
Contractors and Builders of Light Machinery and Hardware Specialties.

M OIL TEMPERED
MORGAN SPRING CO.
WORCESTER, MASS.

LUDLOW-SAYLOR WIRE CO.,

ST. LOUIS, MO.



WIRE, WIRE CLOTH, WIRE ROPE,
Counter Railings, Window Guards, Iron and Wire Fences,
Plain and Barbed Fencing Wire.

NATIONAL WIRE AND IRON CO.,
DETROIT, MICH.,
DRAWERS of Fine Brass and Copper Wire.
ALSO WEAVERS OF
BRASS and COPPER CLOTHS.

THOMPSON McCOSH, President.

JOHN A. McCOSH, Sec. and Treas.


BARB WIRE **LIFTER AND CARRIER.**

NO DANGER OF CUT-
TING HANDS OR TEAR-
ING CLOTHES.
SAVES THE PRICE OF
THE LIFTER MANY
TIMES EVERY DAY.
Manufactured
Solely by
Hawkeye Steel Barb Fence Co., Burlington, Iowa.
Our Agents, John B. Graham & Co., 113 Chambers St., carry stock of our Lifters and will supply at Factory prices.

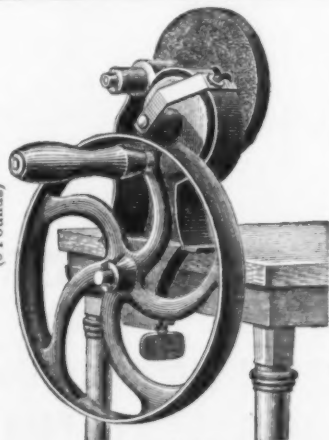
The above cut represents Preston's Patent Braided Cable Wire Fence Rail, manufactured by the
HOLLOW CABLE MFG. CO., Hornellsville, N. Y. We also manufacture extensively
four different sizes Wire Clothes Lines. Send for Circulars and Price Lists.
C. S. CHAMBERLAIN, 55 Dearborn St., Chicago, Ill.

THE BILLINGS & SPENCER CO.
HARTFORD CONN.
MANUFACTURERS OF
DIES MADE IN 5
THREADS FROM
TO 2 INCHES V
U.S. STANDARD AND
DROP FORGED
SCREW PLATES AND
SIZES CUTTING
1/16 OF AN INCH
THREAD. ALSO
WHITWORTH THREAD
OF BAR STEEL.

WICKWIRE BROTHERS, CORTLAND, N. Y.,
MANUFACTURERS OF

WIRE CLOTH AND WIRE GOODS
"CORTLAND"
WINDOW SCREEN
WIRE CLOTH.

Dish Covers,
Corn Poppers,
Coal Sieves,
Flour Sieves,
Etc., Etc.
Metallic Coal Sieve.

COOK'S FRICTION
(8 Pounds)



EMERY GRINDER.

Patent applied for.
This grinder has a 5-in. Emery and Corundum Wheel.
Runs easily to required speed, viz. 1700; is light, weigh-
ing but 8 lbs.; small, occupying but little room; can
be used wet or dry; is well made, the frame and wheel
of charcoal iron with a hard-rubber friction pulley
which can instantly be adjusted to any required ten-
sion; spindle, steel and is just the article for grind-
ing house and shop tools of every description. For
prices address
THE K. & W. MFG. CO., Chillicothe, O.
Chicago Office, 100 State Street.

WIRE NAIL MACHINES

(HARDMAN PATENT.)

Five Sizes for Making Nails
No. 28 to No. 0 Gauge any Re-
quired Length.

Thoroughly tested and in successful operation.
For prices and particulars address

BIRMINGHAM IRON FOUNDRY,
BIRMINGHAM, CONN.

PATENT OFFICE,

Roeder & Briesen,
82 and 84 Nassau St.,
NEW YORK.

American and Foreign
PATENTS

Solicited promptly and at the lowest rates.

"FLORENCE" LAMP STOVE.

PRICE, \$1.50

Weight 4-5 lbs. No glass to break.
Will heat a quart of water quicker
than kindling can be found to gen-
erate a fire in a range. Sent to any
address in the U. S. by express paid
on receipt of \$1.50.

WHAT!
that little
FLORENCE
HEATING STOVE
HEAT A ROOM?
CERTAINLY,
thousands have done so.
Send for circulars, etc. to
FLORENCE MACHINE CO.,
FLORENCE, MASS.
Sample Lamp Stove gratis to responsible dealers upon
application.



OGDEN & WALLACE,

85, 87, 89 & 91 Elm St., New York.

Iron and Steel

Of every description kept in stock.
Agents for Park, Brother & Co.'s
BLACK DIAMOND STEEL.
All sizes of Cast and Machinery Steel constantly on hand.

PIERSON & CO.,

(Established 1790.)

IRON and STEEL,

And GENERAL COMMISSION MERCHANTS.
24, 25, 26 & 27 West Street, NEW YORK.

ABEEL BROS.,

IRON MERCHANTS,

190 SOUTH ST., NEW YORK.

"A. R. M. CO." SHAFTING.

ALSO GENERAL ASSORTMENT OF
"NORWAY," "ULSTER," "CATASAUQUA,"
REFINED AND COMMON IRON,
BAND, HOOP AND SCROLL IRON.
STEEL OF ALL KINDS.
TELEPHONE CALL, "NASSAU, 379."

A. R. WHITNEY & CO.,

MANUFACTURERS OF AND DEALERS IN

Iron and Steel**AGENCIES:**

PORTAGE IRON CO., Limited, Merchant Iron and
Soft Steel.
NORWAY STEEL & IRON CO., Homogeneous
Steel Plates.
RAY STATE IRON CO., Tank, Boiler and Girder
Plates.
BRANDYWINE ROLLING MILL, Boiler Plates.
GLASGOW TUBE WORKS, Boiler Flues.
A. M. BYERS & CO., Wrought Iron Pipe.
CARNEGIE BROS. & CO., Limited, Iron and
Steel Beams, Channels, Shapes and Shafting.
BROOKLYN WIRE NAIL CO., Steel Wire Nails
THE CHESTER PIPE AND TUBE CO.

Plans and estimates furnished and contracts
made for erecting iron structures of every descrip-
tion. Books containing cuts of all iron made sent
on application by mail. Sample pieces at office.
Please address 58 Hudson St. New York.

BORDEN & LOVELL,**Commission Merchants,**

70 & 71 West St.,

NEW YORK.

AGENTS FOR THE SALE OF

Fall River Iron Co.'s Nails, Bands,
Hoops and Rods,

AND

Borden Mining Company's

CUMBERLAND COALS.

IMPORTED & AMERICAN**PIG IRON.**

LAKE SUPERIOR CHARCOAL IRON,

For Malleable and Car-Wheel Purposes,

A SPECIALTY.

CHARLES HIMROD & CO.,

CHICAGO AND DETROIT.

**BOLT & RIVET CLIPPERS,**

For cutting off the ends of Bolts and Rivets, on
carriages, wagons, harness, &c. Ask for them
where you buy your hardware, or send for cir-
cular and price list.

CHAMBERS, BROTHER & CO.,

52nd St., Below Lancaster Ave.,

PHILADELPHIA, PA.

PASSAIC ROLLING MILL CO.

Manufacture and have always in stock

ROLLED IRON BEAMS,

Channels, Angles, Tees, Merchant Bars, Riveted Work,

Forgings, Eye Bars, &c.,

PATERSON, N. J.

Room 45, Astor House, New York.

CUT NAILS,

Hot Pressed Nuts, Bolts, Washers, &c.

DOVER IRON CO.'S

Boiler Rivets, Boiler Brace Jaws, Socket Bolts,

&c., &c.

FULLER BROTHERS & CO.,

139 GREENWICH ST., NEW YORK.

Marshall Lefferts & Co.,

90 Beekman St., New York City,

MANUFACTURERS OF

Galvanized Sheet Iron,

Best Bloom, Best Refined and Common.

Galvanized Wire, Telegraph and Fence; Galvanized
Hoop and Band Iron, Galvanized Rod and Bar Iron,
Galvanized Nails, Galvanized Chain, Galvanized Iron
Pipe.

CORRUGATED SHEET IRON

For Roofing, &c., Galvanized, Plain or Painted.

Best Charcoal, Best Refined and Common
SHEET IRON.

PLATE AND TANK IRON,

C. No. 1, C. H. No. 1, C. H. No. 1 Flange, Best Flange.

Best Flange Fire Box, Circles.

ALL DESCRIPTIONS OF

IRON WORK GALVANIZED OR TINNED TO ORDER.

Price list and quotations sent upon application.

FOX & DRUMMOND,

Cast Iron Gas and Water Pipe,

2 to 48 Inches Diameter,

160 BROADWAY, NEW YORK.

JAMES WILLIAMSON & CO.,

SCOTCH AND AMERICAN

PIG IRON,

No. 63 Wall St., New York.

DANIEL F. COONEY,

88 Washington St., New York,

IRON AND STEEL BOILER PLATES

GLASGOW IRON CO. PINE IRON WORKS.

ALLISON BOILER PLATES.

B. F. JUDSON,

Importer of and Dealer in

SCOTCH AND AMERICAN

Pig Iron,

WROUGHT & CAST SCRAP IRON,

OLD METALS.

457 & 459 Water St., NEW YORK.

233 & 235 South St., NEW YORK.

Phipps & Burman's Clippers.

SEND FOR CATALOGUE AND PRICES.

JOHN BROWER, 81 Murray St.

CHAS. F. LOMBARD

Augusta, Ga.

MANUFACTURERS OF

GIN RIBS &

RAILROAD CASTINGS.

HOWARD, CHILDS & CO.,

Commission Merchants,

No. 514 Smithfield St., Pittsburgh, Pa.

Iron and Steel of all Descriptions,

Iron and Steel Nails, Heavy Hardware,

Coal Hods, Dripping Pans, &c.

Pittsburgh Manufactured Goods of all kinds.

Correspondence solicited. Prices on application.

E. JENCKES MANFG. CO.,

PAWTUCKET, R. I.,

Bright Wire Goods, Belt Hooks,

SPRING PINS, KEYS AND COTTERS.

Best Wire Goods of all kinds a Specialty.

New York Office, 88 Chambers Street.

SAMUEL A. HAINES, Selling Agent.

R. D. WOOD & CO.,

PHILADELPHIA,

Manufacturers of

Cast Iron Pipe

FOR WATER AND GAS.

LAMP POSTS, VALVES, ETC.

Mathew's Pat. Anti-Freezing Hydrants.

400 CHESTNUT STREET.

A. F. PIKE MFG. CO.,

Pike Station, New Hampshire, U. S. A.

Cable Address, "Pike, Haverhill."

MANUFACTURERS AND WHOLESALE DEALERS IN

BLUE STONE.

The Largest Manufacturers and Dealers in Stone for

Sharpening all Edge Tools.

Pike's celebrated Blue

Stone Indian Pond (Red

End), Lamolite, Black Da-

mond, Magic, Green Moun-

tain. All kinds branded

with our name are genu-

ine. Also Oil, Water and Dry

Whetstones; Arkansas

Washita, Turkey, Hindu-

stan and Sandstone

Razor Hones, Vienna

Clear shape.

In fact, everything that is used for sharpening

Edge Tools supplied in any grit or shape required.

Quality and Prices guaranteed. Send in your orders.

FRAS. B. BANNAN,

Pottsville, Schuylkill Co., Pa.

OXFORD**IRON AND NAIL CO.,****Cut Nails**

AND

SPIKES.

J. S. SCRANTON, Sales Agent,

81, 83 and 85 Washington Street,

NEW YORK.

JOHN J. HARRISON

(Successor to HARRISON & GILLOON).

IRON AND METAL DEALER,

558, 560, 562 WATER ST. & 322, 324, 326 CHERRY ST.

NEW YORK.

has on hand, and offers for sale, the following:

Scotch and American Pig Iron, Wrought, Cast and

Machinery Scrap Iron, Car Wheels, Axles and Heavy

Wrought Iron; also old Copper, Composition, Brass,

Lead, Pewter, Zinc, &c.

BURDEN'S**HORSE SHOES.**

"Burden Best"

Iron

Boiler Rivets.

THE BURDEN IRON CO.

TROY, N. Y.

WILLIAM H. WALLACE & CO.,**Iron Merchants,**

COT. ALBANY & WASHINGTON STS.,

NEW YORK CITY.

Wm. H. Wallace. Wm. Bispham. E. C. Wallace.

J. H. Sternbergh, Reading, Pa.,

MANUFACTURER OF

REFINED BAR IRON.

Also as a Specialty

Bolts, Nuts, Washers, Rivets,

LAG SCREWS, TURNBUCKLES,

Rods and Forgings for Bridges and Buildings,

&c., &c., &c.

WM. McFARLAND,**Iron and Brass Founder,**

TRENTON, N. J.

Chilled Cast Wire Dies a Specialty.

Any size or style made at short notice.

**R. D. WOOD & CO.,**

PHILADELPHIA,

Manufacturers of

Cast Iron Pipe

FOR WATER AND GAS.

LAMP POSTS, VALVES, ETC.

Mathew's Pat. Anti-Freezing Hydrants.

400 CHESTNUT STREET.

A. F. PIKE MFG. CO.,

Pike Station, New Hampshire, U. S. A.

Cable Address, "Pike, Haverhill."

MANUFACTURERS AND WHOLESALE DEALERS IN

BLUE STONE.

The Largest Manufacturers and Dealers in Stone for

Sharpening all Edge Tools.

Pike's celebrated Blue

Stone Indian Pond (Red

End), Lamolite, Black Da-

mond, Magic, Green Moun-

tain. All kinds branded

with our name are genu-

ine. Also Oil, Water and Dry

Whetstones; Arkansas

Washita, Turkey, Hindu-

stan and Sandstone

Razor Hones, Vienna

Clear shape.

In fact, everything that is used for sharpening

Edge Tools supplied in any grit or shape required.

Quality and Prices guaranteed. Send in your orders.

FRAS. B. BANNAN,

Pottsville, Schuylkill Co., Pa.

W. D. WOOD & CO., L'D,

PITTSBURGH, PA.

**Planished Sheet Iron.**

Patented April 8th, 1873; Sept. 6th, 1873; Oct.

6th, 1874; Jan. 11, 1876; Oct. 17th, 1876; Jan.

11th, 1877; Feb. 6th, 1877; Dec. 10th, 1878;

Jan. 10th, 1880; Jan. 18th, 1884; Feb. 12th, 1884;

March 4th, 1884; Jan. 6th, 1885.

Guaranteed fully equal in all respects to the

IMPORTED RUSSIA IRON,

and at a less price.

ALSO

Common, Refined, Charcoal and Junata

GRADES OF

BLACK SHEET IRON,

Smooth on both sides.

SYRACUSE**MALLEABLE IRON**

WORKS,

SYRACUSE, - N. Y.

Mower and Reaper Castings and

Carriage Irons a Specialty.

W. B. BURNS, PROPRIETOR.

PENNSYLVANIA IRON WORKS

Everson, Hammond & Orr, Ltd.,

SECOND AVE., PITTSBURGH, PA.,

MANUFACTURERS OF

Light Sheet Iron.

ROOFING SHEET

of all grades a specialty.

Prices quoted promptly upon application.

CORRUGATED AND CRIMPED IRON ROOFING & SIDING,

Iron Buildings, Roofs, Shutters, Doors, Cornices,

Skylights, Bridges, &c.

MOSELEY IRON BRIDGE AND ROOF CO.,

5 Dey Street, NEW YORK.

GEORGE WESTINGHOUSE, Jr., Pres.

JOHN CALDWELL, Treas.

H. H. WESTINGHOUSE, Gen'l. Agt.

T. W. WELSH, Supt.

W. W. CARD, Secy.

Westinghouse Air-Brake Co.

PITTSBURGH, PA. U. S. A.

MANUFACTURERS OF THE

WESTINGHOUSE AUTOMATIC BRAKE, Westinghouse Locomotive Driver

Brake, Vacuum Brakes (Westinghouse & Smith Patents).

WESTINGHOUSE FREIGHT BRAKE.

The Automatic Freight Brake is essentially the same apparatus as the Automatic Brake for

passenger cars, except that the various parts are so combined as to form practically one piece of

mechanism, and is sold at a very low price. The saving in accidents, flat wheels, brakemen's wages

and the increased speed possible with perfect safety, will repay the cost of its application within

a very short time.

The "Automatic" has proved itself to be the most efficient Train and Safety Brake known. Its

application is instantaneous; it can be operated from any car in the train if desired, and should the

train separate, or hose or pipe fail, it applies automatically. A GUARANTEE is given customers

against loss from PATENT SUITS on the apparatus sold them.

The WESTINGHOUSE BRAKE is now fitted to upward of

15,000 ENGINES AND 80,000 CARS,

and is adopted by the principal Railways in all parts of the world.

FULL INFORMATION FURNISHED ON APPLICATION.

LEECHBURG IRON WORKS.

KIRKPATRICK & CO. LIMITED

Manufacture of all Grades of

FINE SHEET IRONS,

(Refined, Cold Rolled, Show Card, Stamping, Tea Tray, Polished, Shovel, Ferrule Iron, &c.)

NATURAL GAS USED AS FUEL.

OFFICE, No. 143 First Ave., Pittsburgh, Pa.

WORKS, Leechburg, Pa.

Only single Ring ever invented

that closes on outside of the nose.

BROWN'S

Elliptical Ring

and Triple Groove Hog and Pig Ringer

WILLIAM R. HART & CO.,

AMERICAN AND FOREIGN
PIG IRON, SPIEGELEISEN,
 STEEL BLOOMS, CROP ENDS,
 TIN PLATES, &c.
 No. 226 WALNUT ST., PHILADELPHIA.

HENRY LEVIS & CO.,

Manufacturers' Agents
 For Iron and Steel Rails, Car Wheels, Boiler
 and Sheet Iron and General
 Railway Equipments.
 Old Rails, Axles and Wheels bought and sold.
 234 S. 4th St., Philadelphia.

Heavy Rails, Light Rails, Railway Fastenings, STREET RAILS.

Cambria Iron Co.,

OFFICE, 218 South Fourth St., Philadelphia, Pa.
 WORKS, Johnstown, Pennsylvania.

The Phoenix Iron Co.,

410 WALNUT ST., PHILADELPHIA,
 Manufacturers of Wrought Iron
Beams, Deck Beams, Channels, Angle & Tee Bars,
 STRAIGHT AND CURVED TO TEMPLATE,
 Largely used in the construction of Iron Vessels, Buildings and Bridges.
 Wrought Iron Roof Trusses, Girders and Joists, and all kinds of Iron Framing used in the con-
 struction of Fire-Proof Buildings; Patent Wrought Iron Columns, Weldless
 Eye Bars, and Built-up Shapes for Iron Bridges.
 REFINED BAR, SHAPING, and Every Variety of SHAPE IRON Made to order.
 Plans and Specifications furnished. Address DAVID REEVES, President.
 New York Agents, MILLIKEN & SMITH, 95 Liberty St.
 Boston Agents, FRED. A. HOUDLETTE & CO., 19 Batterymarch St.

ALAN WOOD & CO.,

MANUFACTURERS OF
 Patent Planished, Galvanized, Common, Best Refined, Cleaned and Charcoal Bloom
PLATE & SHEET IRON,
 ALSO LIGHT PLATES AND SHEETS OF STEEL,
 No. 519 Arch Street, Philadelphia, Pa.
 Orders solicited especially for Corrugated, Gasholder, Pan and Elbow, Water Pipe, Smoke Stack,
 Tank and Boat Iron; Last, Stamping, Ferrule Locomotive Headlight and Jacket Iron.

W. H. WALBAUM & CO.,

206 S. Fourth St., Philadelphia. 61 Pine St., New York.
NEW AND OLD RAILS, BLOOMS, BESSEMER PIG.
 Crop Ends, Spiegeleisen, Iron Ores and Railroad Supplies Generally.
 AGENTS IN THE UNITED STATES FOR

THE NORTH LONSDALE IRON & STEEL CO., Limited, Bessemer Pig Iron, brand "Ulverston;"
 Malleable Pig Iron, brand "U. H. M."
 MOSS BAY HEMATITE IRON & STEEL CO., Limited, Spiegeleisen, Crop Ends, &c.
 Also for "Lorn" Malleable Charcoal Pig Iron and N. B. ALLEN & CO.'S Dinas Fire Bricks.
 Also Sole Agents for the WHITE RIVER MINING CO.'S Arkansas Manganese Ore, Guaranteed 30 per
 cent. Metallic Manganese.

**PENCOYD IRON WORKS,
A. & P. ROBERTS & CO.,**

MANUFACTURERS OF
**BEAMS, CHANNELS, DECK BEAMS, ANGLES, TEES,
 PLATES, MERCHANT BAR.**

STANDARD
 SHAFTING AND ROLLED OR HAMMERED AXLES OF IRON OR STEEL.
 Office, No. 26 S. Fourth St., Philadelphia. Agents for the sale of Glamorgan Pig Iron.

**GORDON, STROBEL & LAUREAU,
ENGINEERS,**

No. 226 Walnut St., Philadelphia, Pa.
**BLAST FURNACE CONSTRUCTION,
 STEEL WORKS CONSTRUCTION.**

AGENCIES:
 Fire Brick Hot Blast Stove Co., Krupp Gas Producer, Terrenoire
 Steel Casting Process, Bell Bros.' Coal Washing Machines,
 Krupp-Bell Dephosphorizing Process.
 SPECIALTIES:
 Gordon's Patent Improved Whitwell-Cowper Fire-Brick Stoves, Gordon's
 Patent Stationary Converter, Laureau's Pitless Converter-House Sys-
 tem, Bell Bros.' Coal Washing Machines, Krupp Gas Producers,
 Regenerative Heating and Melting Furnaces.

THE ALLENTOWN ROLLING MILLS,

MANUFACTURERS OF
 Rails, Bars, Axles, Shafting, Fish Bars (Plain and Angle), Spikes,
 Rivets, Bolts and Nuts, &c. Bridges and Turn-Tables.
 General Office, 337 South Third St., Philadelphia. Works at Allentown, Pa.

**J. W. PAXSON & CO., DEALERS IN
MOULDING SAND,**

1021 North Delaware Ave., Philadelphia, Pa.

 MANUFACTURERS
 X MINERAL, CHARCOAL FACING, LEAD FACING,
 XX MINERAL, ANTHRACITE FACING, RIDDLES, SHOVELS,
 IXL FACING, SOAPSTONE, STEEL BRUSHES.

EDWARD J. ETING,
 IRON BROKER & COMMISSION MERCHANT,
 222 S. THIRD ST., PHILADELPHIA, PA.
**PIG, BAR AND RAILROAD IRON,
 OLD RAILS, SCRAP, &c.**

Agent for the
Mount Savage Fire Brick.
 EXCLUSIVE AGENT FOR
LYNCHBURG IRON CO.,
 LYNCHBURG, VA.
 Foundry and Forge Pig Iron.
 STORAGE, WHARF AND YARD, Delaware Avenue,
 above Callowhill St., connected by track with rail-
 road. CASH ADVANCES MADE ON IRON.

JAS. G. LINDSAY. THOS. S. PARVIN.
LINDSAY, PARVIN & CO.,
 Successors to LLOYD & LINDSAY,
 338 Walnut Street, Philadelphia.

Iron Ship and Bridge Builders' Materials, Steel
 and Iron Shapes and Bars, Sheet Iron, Sheet Steel,
 Pig Iron, Muck Bars, Plate Girders for Bridges and
 Buildings. Contracts placed for Iron Structures.

Ethelbert Watts. Jos. C. Poulterer.
ETHELBERT WATTS & CO.,
 Iron Brokers and Commission Merchants,
 No. 390 So. Third Street, Philadelphia.
 SALES AGENTS FOR
 Pennsylvania and Virginia Pig Iron, "Corn-
 wall," "Chester," and Other Iron Ores.
 Dealers in Old Rails and Iron and Steel Scrap of all
 kinds. Correspondence solicited.

L. & R. WISTER & CO.,
 IRON COMMISSION MERCHANTS,
 257 So. 4th St., Philadelphia.

AGENTS
 Kemble and Norway Foundry and Forge Pig Iron.
 Wyebrake C. B. Charcoal Pig Iron. Ferguson
 Red Short Pig Iron.
 DEALERS IN ALL KINDS OF SCRAP IRON.

MORRIS, WHEELER & CO.,
 Iron, Steel and Nails.

WAREHOUSE & OFFICES, 16th & Market Sts., PHILA., PA.
 SALES OFFICES, 400 Chestnut St., PHILA., PA.
 New York Address, 14 CLIFF ST.

ROBT. MOFFLY & CO.
 Bankers and Brokers, and Wholesale Dealers in
SCRAP IRON
 AND METALS,
 PHILADELPHIA.

Yard, N. E. Cor. Ninth and Jefferson Streets,
 E. G. JAMES, Manager.
 Bk'g Office, 312 Stock Exchange Pl. Room 4.

Established 1847.

**A. WHITNEY & SONS,
 CAR WHEEL WORKS,
 PHILADELPHIA.**

Special Wheels for Furnace and Mine Cars.

PLYMOUTH ROLLING MILL CO., Conshohocken, PA.

MANUFACTURERS OF
Pig Iron,
 Foundry and Forge.
Puddled Bars,
 Special for Axles, Best Neutral and Common.
 Particular attention given to Iron for Special Purposes.

Plate and Sheet Steel,
 Every description of Light Plates and
 Sheets of Steel.
Plate and Sheet Iron,
 Best Bloom, Tube, Cleaned, Best Refined,
 Skelp, Blue Annealed and Common.

TESTED CHAINS.

Bradlee & Co., Empire Chain Works,
 816 Richmond St., Philadelphia.

Chains for Foundry Cranes and Slings.
 "D. B. G." Special Crane Chain.
 Steel and Iron Dredging, Slope and Mining Chains.
 Ship's Cables and Marine Railway Chains.

CUMBERLAND NAIL AND IRON CO.,

MANUFACTURERS OF
"CUMBERLAND" NAILS & WROUGHT IRON PIPE,
 43 North Water St., and 44 North Delaware Ave., PHILADELPHIA.

J. Tatnall Lea & Co.,

Successors to CABEN & CO.,
IRON COMMISSION MERCHANTS,
 No. 400 Chestnut Street, Philadelphia.
 BESSEMER, MILL AND FOUNDRY PIG IRON, SKELP IRON, MUCK AND SCRAP BARS, NATIVE
 AND FOREIGN ORES. AGENTS FOR CONNELLSVILLE COKE.

LOCOMOTIVE AND CAR-WHEEL TIRES

Manufactured from the celebrated OTIS STEEL BRAND
STANDARD
 Quality and efficiency fully guaranteed. Prices as low
 as any of the same quality. We manufacture Heavy and
 Light Forgings, Driving and Car Axles, Crank Pins, Piston
 Rods, &c.

THE STANDARD STEEL WORKS,
 WORKS AT LEWISTOWN, PA.
 Office, 220 S. 4th St., Philadelphia, Pa.

**BOOTH, GARRETT & BLAIR,
ANALYTICAL AND CONSULTING CHEMISTS,**

919 and 921 Chant St. (10th St., above Chestnut St.), Philadelphia, Pa.
 Established in 1836.

Analysis of Ores, Waters, Metals and Alloys of all kinds. A special department for the
ANALYSIS OF IRON AND STEEL,
 fitted with all the apparatus and appliances for the rapid and accurate analysis of Iron, Steel, Iron
 Ores, Slags, Limestones, Coals, Clays, Fire Sands, &c. Agents for sampling ores in New York and
 Baltimore. Price lists on application.

JUSTICE COX, JR. CHARLES K. BARNES.
JUSTICE COX, JR., & CO.,
 Agents for

Chickies, Conewago, Montgomery and Shenandoah
**FOUNDRY and FORGE
 PIG IRON.**
 CARBON ROLLING MILL CO., Limited, Best Qual-
 ity Muck Bar, CATASAUQUA MFG. CO.'S Bar,
 Angle, Skelp and Sheet Iron. Shenandoah
 (Va.) Best Charcoal Blooms.
 No. 224 So. Fourth St., Phila.

Jerome Keeley & Co.,

206 Walnut Place, Phila.,
 Selling Agents for CHARCOAL and ANTHRACITE
 BLOOMS, PIG IRON, BAR IRON, SHEET IRON,
 STEEL and IRON RAILS, IRON CLAD STEEL, RAILS
 and BARS, MAGNETIC and HEMATITE IRON ORES,
 FIRE BRICK, COAL and COKE, MUCK BARS. Handle
 Old Iron and Steel Rails, scrap iron, &c. Examine
 and negotiate sales of Iron and Coal properties.

E. H. WILSON & CO.,
 230 South Third Street, Philadelphia,
 BROKERS AND DEALERS IN

IRON AND STEEL.
 Correspondence solicited.

**J. W. HOFFMAN & CO.,
 IRON COMMISSION MERCHANTS,**

208 South Fourth St., Philadelphia.
 Selling Agents PINE IRON WORKS, Pine Brand
 Plates; GLASGOW IRON CO., Plates and Muck Bars;
 SPRANG STEEL & IRON CO. (Limited), Siemens-
 Martin (Open-Hearth) Steel, Universal and Sheared
 Plates, Angles and Shapes.

**JNO. L. HOGAN,
 IRON COMMISSION MERCHANT,**

216 SOUTH FOURTH ST., PHILA.
Pig Iron & Ores, Steel & Iron Blooms.
 Agent for Briar Hill Iron and Coal Co.,
 Youngstown Steel Co. Open Hearth Metal,
 Charcoal Iron, Connelville Coke,
 Old Rails, Scrap, &c.

FOR BEST MILL
 PRODUCTS.
Andover Pig Iron
 Andover Chill Iron
 for Carwheels, &c.
 Each Pig marked exact chill depth (3/4 in. to 3/8 in.).
 A. Whitney & Son's standard test.
 F. A. COMLY, Treas.
 J. WESLEY PULMAN, Agent. 240 So. 3d St., Phila.

J. J. MOHR,

430 WALNUT ST., PHILA., PA.
 SOLE AGENT FOR
 Sheridan, Leesport, Temple, Lynch-
 burg, Millcreek and Mt. Laurel

Foundry **PIG IRON** and Forge

CHARCOAL PIG IRON.
 Also Woodbridge Clay Mining Co.'s Fire Brick.

Nail-Making in Russia.

Acting Consul-General Swann, at St. Petersburg, writes the State Department concerning the work and product of workers in Russia. The "kustar" is a peasant who manufactures by hand in his own family shop. Of these laborers the nail-makers will interest our readers. The Consul-General says: "In the Government of Iver the labor of the smith assumes fair kustarian proportions. Thus, in 1881 there were 3047 smitheries, giving employment to 7733 kustars. In 1200 of these smitheries 4402 blacksmiths and 600 women are engaged in the industry of nail-making. Bitter is the task of the nail-maker—one of the most laborious and thankless vocations in kustarian régime. The hours of labor have a weird association, for the workers do not sleep, as do others, at night; nor does this occupation grant long rests from its weary toil. Sleep and nourishment are snatched during a two-hours' rest that intervenes between the changes of four hours' incessant work. Thus the day is divided into four changes. The origin of this strange custom I have not been able to learn. All of the kustars engaged in nail-making operations are haggard, ill-conditioned and most sickly looking, and more especially are such attributes noticeable in the junior workers engaged in these occupations, wherein children commence labor as nail-makers when but nine years of age.

The nail-makers, as a rule, work for task masters—that is to say, they are body and soul in the hands of dealers and middle-men, who retain them at this industry under the most economical terms and conditions, by furnishing them with materials at high prices and purchasing the wares at the lowest attainable figures. The nail-workers in the Government of Iver annually produce about 80,000 pounds (2,880,000 pounds) of nails, valued at 400,000 roubles (\$200,000). A single nail-maker, according to capacity, may make from 45 to 125 roubles (\$22.50 to \$62.50) during the winter. The nails made in the Government of Iver are of 13 different kinds, divided into 54 sorts. The large nails, of which there are 10 kinds, vary in sizes and count from 22 to 575 to the pound; the smaller kinds, tacks, brads, &c., from 770 to 1650 to the pound. These wares are sold at 3 roubles 80 copecks to 8 roubles (\$1.90 to \$4) per pound (36 pounds), or 5 1/2 cents to 11 cents per pound. Many of these nails are consumed in the district, but the far greater proportion is retained in other Governments. As may be imagined, this industry is on the wane, and the gradual but general increase of machinery introduced into the trade in other localities bids fair to oust the kustars at an early date. In the Government of Iver the making of horse-shoe nails has already been discontinued, and the hand worked nail industry must shortly be confined to an output of most limited dimensions.

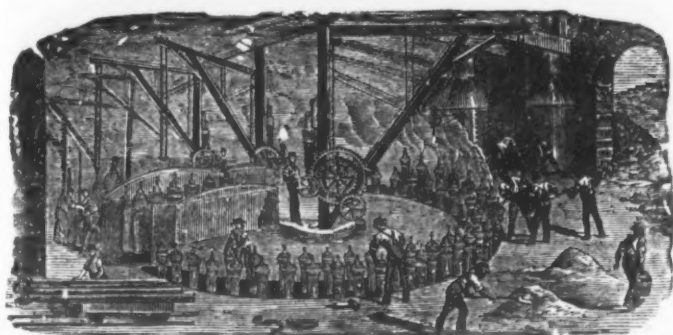
The New Jessop Steel Works, at Sheffield.

The Ironmonger gives the following description of the new works of W. Jessop & Sons, of Sheffield, England, which has the capacity of turning out a 45-ton steel casting:
 How completely the new plant throws the old foundry into the shade may be gathered from the dimensions and capacity of the two. The original building is about 120 feet long by 60 feet span, and the maximum weight of the castings produced therein was 15 tons. It should be stated, however, that castings of this size could be turned out entirely with crucible steel, and therefore with no other steel-producing appliance than the "pots" in which that steel is melted. In the new foundry the steel is supplied by a system which is a modification of the Siemens gas furnace, and is known as the "Siemens-Jessop process." By this system a steel is obtained which in all respects equals, for the purposes of heavy castings, the ordinary pot steel, with the supreme advantage of more than trebling the quantity of metal obtainable for a single casting. The main building of the new foundry is 252 feet long by 140 feet wide, the width being obtained by two spans of 56 feet, with a lean-to of 25 feet. The height of the roof from the ground is 38 feet, and of the crane girders 27 feet. There are two Siemens-Jessop furnaces with a total capacity of 30 tons, while a third is in course of erection which will alone yield 20 tons per heat. This will not, however, represent the total producing power of the firm, as it is proposed to combine, as occasion arises, the resources of the two foundries. By this arrangement the steel output of the old foundry will be rapidly carried from the one building to the other by locomotive engines, and a combination casting 65 tons in weight will therefore be at any time a possible achievement. The new foundry also includes an improved system of casting-pits, under which the pit becomes a drying and annealing stove, the whole heat, as in the furnaces, being supplied by gas. There are two large pits in which these processes are combined, the pits in each case being incased in a huge wrought-iron tank. There is a third pit 30 feet deep, in which crank-shafts and propellers can be cast on end.

In Chicago there is a "central shaft propeller" on exhibition, invented by Joseph Goodrich. It is a little model, about 5 feet long, and with boiler, engine and steering apparatus complete makes its voyages in a 16-foot tank. It is driven by means of a new system of self-actuating blades attached to endless carriages along the sides of the ship. Mr. Goodrich discovered that a blade pivoted at the center of its two ends, and thus hung in a frame, leaving it free to revolve, would, if drawn through the water by such a frame, turn its broadside to the resisting fluid, whereas any one would suppose that it would turn edgewise, and thus go through the water with the least resistance. By means of this invention or contrivance a carrier of 50 or more automatic blades can be made to travel along the sides and take direct hold of the water with such force and in so many places at the same time as almost to avoid slipping, and thus allow the entire force of the steam to be expended in moving the boat instead of churning the water. Mr. Goodrich asserts that he has spent 16 years in studying out the principle.

A. H. McNEAL,
BURLINGTON - - - NEW JERSEY.

FLANGE PIPES.



General Foundry Work.

CAST IRON PIPES
FOR WATER AND GAS.

ESTABLISHED IN 1848.

SINGER, NIMICK & CO., Ltd.,
PITTSBURGH, PA.,

MANUFACTURERS OF ALL KINDS OF

HAMMERED AND ROLLED

STEEL,

WARRANTED EQUAL TO ANY PRODUCED.

BEST REFINED TOOL CAST STEEL

For Edge and Turning Tools, Taps, Dies, Drills, Punches, Shear-Knives,
Cold-Chisels and Machinists' Tools generally.

SAW PLATES

For Circular, Mulay, Mill, Gang, Drag, Pit and Cross-Cut Saws.

Sheet Steel

For Springs, Billet Web and Hand Saws, Shovels, Cotton Gin Saws,
Stamping Cold, &c., &c.

SIEMENS-MARTIN (Open-Hearth) PLATE STEEL

For Boilers, Fire Boxes, Smoke-Stacks, Tanks, &c.

All our Plate and Sheet Steel being rolled by a Patented Improvement, is unequalled for
surface finish and exactness of gauge.

ROUND MACHINERY CAST STEEL

For Shafting, Spindles, Rollers, &c., &c.

File, Fork, Hoe, Rake, R. R. Frog, Toe-Calk, Sleigh-Shoe and Tire Steel, &c.;
Cast and German Spring and Flow Steel.

"Iron Center" Cast Plow Steel. Finished Rolling Plow Coulters, with Patent Screw Hubs
"Soft Steel Center" Cast Plow Steel. Agricultural Steel cut to any pattern desired. [attached.
"Solid Soft Center" Cast Plow Steel. Steel Forgings made to order.

Represented a 248 Pearl and 18 Cliff Sts., New York, by

HOGAN & SON, General Agents for Eastern and New England States.

HOGAN & McCARGO, 417 Commerce St., Philadelphia, and FULLER, DANA & FITZ, 110 North St., Boston.



FRANKFORD STEEL COMPANY,
FRANKFORD, PHILA., PA.,

STEEL RAILROAD AND MACHINE FORGINGS,

SOLID CRUCIBLE STEEL CASTINGS

AND

Best Grades of Tool and Machinery Steel.

Light Steel Rails,

40 lbs., 35 lbs., 30 lbs., 25 lbs., 20 lbs. and 16 lbs. per yard.

APPROVED PATTERNS.

For Mine, Lumber and Narrow-Gauge Railroads.

ALSO SPLICE PLATES, SPIKES, SWITCHES, FROGS, &c., &c.

PENNSYLVANIA STEEL CO. { 208 So. 4th Street, Philadelphia.
or Steelton, Dauphin Co., Pa.,
or 160 Broadway, New York.

TOWER'S CHAMPION SCREW DRIVER.
SOLID BOLSTER AND FLUTED HANDLES.

Patented May 15, 1877 and April 29, 1879.



Hand Forged. Tempered in Oil. Warranted.

EVERY BLADE TESTED AT THE FACTORY.

MADE BY

TOWER & LYON, 96 Chambers St., New York.

Established 1861.
THOMAS C. BURROWS,
Agent for Jersey City Steel Company,
Manufacturers of **STEEL** Of All Descriptions.
WAREHOUSE, 99 and 101 JOHN ST., NEW YORK.

STANDARD STEEL CASTING CO.,

THURLOW, PA.,

Open Hearth and Crucible

STEEL CASTINGS.

QUALITY EQUAL TO STEEL FORGINGS.

Can be Bent, Welded or Forged.

STEEL INGOTS, Best Stock, Furnished to Order.

Ship Patterns direct to Thurlow, Pa., via P. W. & B. R. R., or via P. & R. R. R.

We are prepared to make all kinds of Heavy or Medium Weight

STEEL CASTINGS

FROM

OPEN HEARTH METAL.

We wish to give special attention to making Cast Steel Rolls of all sizes, Mill
Gearing wherever Cast Steel is suitable. Also Cranks, Cross Heads, Shafts,
&c., for Steam and Blowing Engine construction.

Being desirous of securing a share of public patronage, we will endeavor to make our
product equal in quality to any in the market.

MACKINTOSH, HEMPHILL & CO., Limited,
PITTSBURGH, PA.

HICKS & DICKEY,

413 Commerce Street, Phila., Pa.,

IRON AND STEEL.

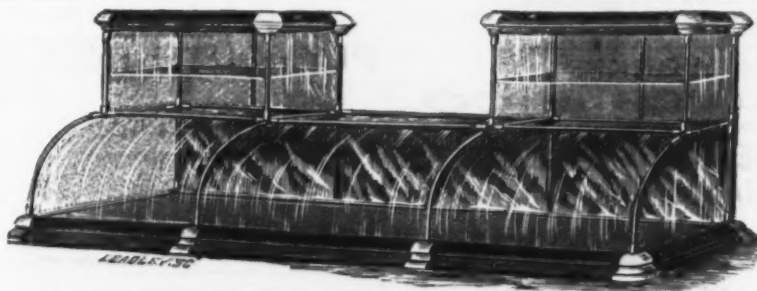
EASTERN AND SOUTHERN AGENTS,

CROWN & CUMBERLAND STEEL CO.,
CAST TOOL STEEL.

HARTMAN STEEL CO., LTD.,

Tire, Toe, Sleigh, Machinery, Spring Steel, &c.

W. S. SIZER'S FORGINGS, STEEL AND IRON.



FARLEY & HOFMAN,

ROCHESTER SHOW CASE WORKS,

Manufacturers of **SHOW CASES** of every description. Agents wanted in principal cities,
Branch stores, 39 and 41 West Broadway, New York; 677 Broadway, Albany, N. Y. Catalogues sent
on application. Mention The Iron Age.

Office and Factory, 280 State St., Rochester, N. Y.

"THE CARVERS' FRIEND."

PATENT APPLIED FOR.



SOLID EMERY KNIFE SHARPENER.

Has no equal for durability, convenience and effectiveness. It is not a wooden stick
with a thin coating of emery, but is made solid, of best Turkish emery, with steel wire
center to prevent breaking, and will last for years. A sharp, keen edge quickly given to
the dullest knife. Unquestionably the best Knife Sharpener made. It sells rapidly and
always gives satisfaction. Price, with apple-wood handles, \$6.00 per dozen. Cocobolo
handles, \$9.00 per dozen. Trade discount 40 per cent.

MANUFACTURED BY

WM. H. PARKIN, 9 & 11 S. Water St., CLEVELAND, O.
JAS. D. FOOT, Eastern Agent, 101 Chambers St., NEW YORK.

GEO. B. CURTISS,

95 Chambers St., New York,

Wrought Bar Agricultural Wrenches

AND

**HEAVY BAR
MECHANICS'
WRENCHES**



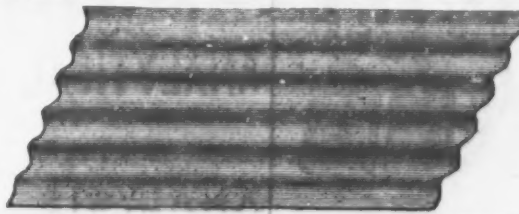
IMPROVED.

129 & 131 So. Clinton St., **KNISELY & MILLER,** Chicago, Illinois.

MANUFACTURERS OF

CORRUGATED IRON,

PAINTED
OR
GALVANIZED,



STRAIGHT
OR
CURVED.

THREE SIZES OF CORRUGATION.

We carry at all times a large stock from which we can fill orders promptly. Send for Catalogue and Price.

WROUGHT IRON

BOILER TUBES.

Steam, Gas and Water Pipe, Oil
Well Tubing, Casing

AND

LINE PIPE.

Cotton Presses, Forgings, Rolling
Mill and General Machinery.

READING IRON WORKS

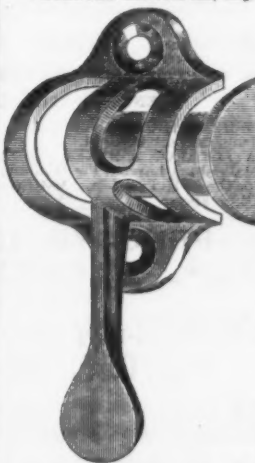
261 S. Fourth St., Philadelphia.



FRANKLIN S. MILES,
Manufacturer of
**Brass, Iron, Steel and German Silver
SCREWS,**
205 Quarry St., Philadelphia.

**The Common Sense Sash Holder
and Lock Combined.**

PATENTED MARCH 6th, 1885.



Is the best, cheapest
and most complete
Sash Holder
and Lock in the
market, and we
think has the
largest sale.
It holds the window
at any point, and
locks the same
when down, and
entirely prevents
wind from
rattling.
I am the sole
owner of this
patent, and so a
manufacturer of
these fasteners,
and all persons
are hereby notified
of this fact.
Any parties in-
fringing will be
dealt with ac-
cording to law.
Parties who have
been buying and
selling the "Prac-
tical Fastener,"
so-called, will do
well to heed the
warning. Orders
from the trade
respectfully solici-
ted.

Circular with price list mailed on application.

H. A. WILLES,

MANUFACTURER AND DEALER IN HARDWARE

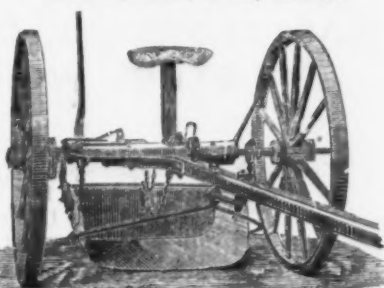
SPECIALTIES AND OIL AND GAS STOVES,

727 Market Street, PHILADELPHIA, PA.

THE

FAY SULKY SCRAPER.

AUTOMATIC, SIMPLE, STRONG, DURABLE.

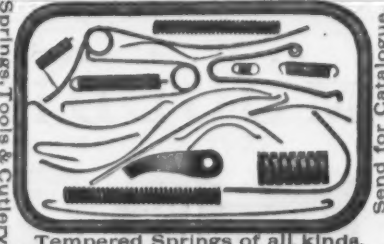


The latest improved and best of all Scrapers
for contractors and others. No stoppages re-
quired. Causes teams no sore necks. Greatly
improved for present season. Try it and you will
use no other. Agents wanted.

ADDRESS

FAY MFG. CO., Elyria, Ohio.

TUCK M'FG CO. Brockton, Mass.



Tempered Springs of all kinds.



GEO. M. EDDY & CO.,
Manufacturers of

Measuring Tapes

of Cotton, Linen and Steel.

FOR ALL P. R. POSSES.

351 to 353 Classon Ave., Brooklyn, N. Y.

SILVER & DEMING MANUFACTURING CO.,

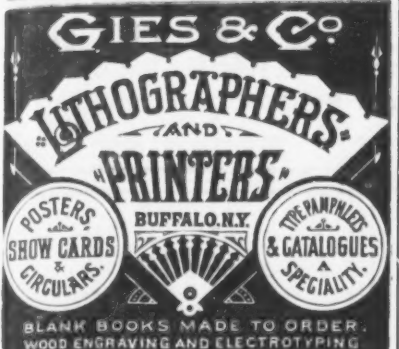
Salem, Ohio, U. S. A.,
MANUFACTURERS OF
CISTERN, PITCHER, WELL and
FORCE
PUMPS

Wind Mill Pumps, Hand
and Power Rotary
Pumps,
HYDRAULIC RAMS,
Boiler Feed Pumps, Gar-
den Engines, &c.
Also Carriage Makers' Tools,
Blacksmiths' Drills, Butchers'
Tools, and Feed Cutters.

Write for Catalogue and Prices.
English Bros., Kansas City, Mo.,
GENERAL WESTERN AGENTS.

European Agency with SELIG, SONNENTHAL & CO.,
London E. C., England.
PANCOAST & MAULE, Phila., Pa., Eastern Agents.

Blank Books Made to Order.
WOOD ENGRAVING AND ELECTROTYPING



JOHN MAXWELL,
Manufacturer of
Patented
BRASS, BRIGH
TINNED WIRE
& JAPANNED
Bird Cages.

The cheapest and most
salable in market.
Catalogues and Price
Lists furnished to the
trade.
247 & 249 Pearl St.,
New York.

Full size of Band for Brass and Tinned Wire Cages.



DUNBAR BROS.,
Manufacturers of
Clock Springs and Small Springs
of every description, from best Cast Steel.
BRISTOL, CONN.

FIELD'S
IMPROVED
FORCE PUMPS.
Latest, Cheapest
and Best.
Household, Orchard
and Well
Force Pumps,
Pitcher Pumps,
Tub Well Pumps,
ECONOMY
Garden Engine.

Send for Catalogue.
Field Force Pump Co.,
Market St., Lockport, N. Y.

GUN POWDER.

LAFLIN & RAND POWDER CO.,
No. 29 Murray Street, New York,
Manufacture and sell the following celebrated brands
of Sporting Powder, known everywhere as

Orange Lightning, Orange Ducking,
Orange Rifle,
more popular than any Powder now in use.

BLASTING POWDER AND ELECTRICAL BLASTING
APPARATUS. MILITARY POWDER on
hand and made to order

Safety Fuse, Frictional and Platinum Fuses.
Pamphlets showing sizes of grain sent free.

NEW MAKE OF MINE LAMP.
THREE DIFFERENT
SIZES SPOTS
SEND
15 CENTS
FOR SAMPLE
TO
LEONARD BROS., Scranton, Pa.

PATENTS
AND PATENT SUITS.
Please send for Circular to
THOMAS D. STETSON,
22 Murray St., New York.

W. & B. DOUGLAS.
MIDDLETOWN, CONN.,
The Oldest and Most Extensive Manufacturers of
PUMPS, HYDRAULIC RAMS, GARDEN ENGINES,
Yard Hydrants, Street Washers, Galvanized Pump Chain, Wind Mill
Pumps and other Hydraulic Machines in the World.

Fig. 120. Fig. 200. Fig. 70.

Wrought Steel Sinks.

One of the strong points of these sinks is the new coupling with which they are now supplied and which is pronounced by all plumbers the best on the market. It is used with both lead and wrought-iron pipe; is a neat, reliable coupling, and is easily detached for the purpose of pumping out the pipe. The strainer and all parts of the coupling are turned, and are furnished with all sinks without extra charge.

The fact of the great strength and durability of this sink, as it is practically free from danger of breakage in transportation, handling or use, is a strong point in its favor, and that its merits are recognized by most competent judges is evident from the fact that leading houses which have been interested in the common article have taken up the Wrought Steel Sink. Twenty-five per cent. is saved in freight by purchasing Steel Sinks. Orders come from all parts of the United States, Canada, Europe and Australia.

BRANCH WAREHOUSES:
85 and 87 JOHN STREET NEW YORK, and 197 LAKE STREET, CHICAGO, ILL.

UNION MANUFACTURING CO.,
MANUFACTURERS OF ALL STYLES
Plain and Ornamental Butts,
LOOSE PIN REVERSIBLE, CAST FAST AND LOOSE,

Drilled and Wire Jointed, Japanned, Figured Enam-
eled, Nickel Plated and Real Bronze Butts.
Also a Full Line of
IRON AND BRASS PUMPS,
Cistern, Well and Force Pumps, Yard Drive Well,
Garden Engine and Steam Boiler Pumps, Hydraulic
Rams, &c., and all with the most modern improvements.

UNION SPIRAL SPRING HINGES.
We beg to call the attention of Architects, Builders, Dealers, and
all interested parties, to our Spiral Spring Hinge, knowing it to be
an effectual and durable one, neat in appearance, easy to put on,
and not liable to get out of order. The Springs are made from
wire made expressly for us and for this particular purpose, with
the view of great elasticity, durability and power. They produce a
continuous pressure from the point where the door is wide open
until it is closed, and then hold it perfectly in position. It has a
solid pintal in connection with short hollow ones, causing little or
no friction, the whole power of the Spring being exerted in swing-
ing the door. It is Fast Joint, and can be used for either right or
left hand, allowing the dealer to carry less stock, and the builder
will never get the wrong hand.

FINE CASTINGS A SPECIALTY.
New Britain, - Connecticut.
Warehouses: 103 Chambers Street, New York, and
164 Lake Street, Chicago.
Illustrated Catalogue and Price List furnished
upon application.

GEORGE BROOKE, President. GEO. W. HARRISON, Treasurer.

THE E. & G. BROOKE IRON CO.,
BIRDSBORO, BERKS CO., PA.,
MANUFACTURERS OF
ANCHOR NAILS AND SPIKES. BRAND
Capacity, 1000 Kegs per Day.
Made from their own Pig Iron, insuring Regularity and Superiority in Quality.

ALSO
FOUNDRY AND FORGE PIG IRON,
AND COLD BLAST CHARCOAL CAR WHEEL IRON.

OLD DOMINION
CUT NAILS, BAR IRON.

R. E. BLANKENSHIP, President,
RICHMOND, VA.

IRON AND STEEL DROP FORCINGS
All shapes, small and large, including
GUN, PISTOL, WRENCH BARS, &c. ALSO, DIE SINKING, MANUFACTURERS ALSO
OF BRICKLAYERS', MOULDERS' AND PLASTERERS' TOOLS,
SADDLERS' BOUND AND HEAD KNIVES.

WILLIAM ROSE & BROS.,
36th & Filbert Sts., WEST PHILADELPHIA.

NATIONAL HARDWARE & MALLEABLE IRON WORKS,
Lehigh Avenue, American and Third Streets, Philadelphia.
THOMAS DEVLIN & CO.,
MALLEABLE, FINE GRAY IRON AND STEEL CASTINGS made from patterns to
order. Special attention given to Tinning, Bronzing, Coppering, Japanning and Fitting. A large line
of Carriage and Wagon Castings constantly on hand for the trade.

BALL
BEARING DOOR MANGERS
For House Doors, Car Doors, Elevator Doors.
Frictionless. Indestructible. Perfect. Send for Circular.
CONHOES IRON FOUNDRY & MACHINE CO., CONHOES, N. Y.

English Letter.

(From Our Regular Correspondent.)

LONDON, NOVEMBER 16, 1885.

THE OUTLOOK

has not altered much since my last week's report. We are becoming more and more deeply immersed in electioneering matters, and it is to be feared that many men of business are being led away from the solid cares of commerce to the fleeting and foolish animosities of the electoral struggle. The first voting will take place about a week hence, and the polling will then be proceeded with until it has been completed, which desirable consummation will be attained by about December 6 or 7. Many precasts are being made as to the net result of the fight, but there is no unanimity in the ranks of the prophets. Some weeks ago the Liberals were very confident that they would secure a majority sufficient to outvote the combined forces of the Tories and the Parnellites. To do this the Liberals would need some 340 or 350 members. They now have 330 who were elected amid a "Liberal boom" never before known, and at a time when the Tories were greatly discredited. It will be extraordinary, therefore, if Mr. Gladstone is backed by a larger majority than the one by which he was supported in the Parliament just deceased. The Tories (or Conservatives, as they are called indiscriminately) have now 247 members, and the Irish 61, 14 seats being vacant. Allowing for the extended franchise, &c., it is not easy to see where the Liberals are going to get their anticipated overwhelming majority. There will be 670 members in the new House of Commons, and of these it is known that quite 80, or that to 85, will be followers of Mr. Parnell. If, therefore, the Liberals return 300 to 310 men they will do well—indeed, it seems certain that neither party will be able to defy the Irishmen. Within the past few days the Tories have become more cheerful, and some of them now count upon a majority over the Liberals. The raising of the church disestablishment question must help the Tories greatly by rallying all the churchmen to their side, while the fair-trade question will undoubtedly operate in the same direction. The latter issue the Liberals appear determined to ignore altogether, but they will find that they have made a serious tactical error. As time goes on and the electioneering fight progresses, evidence accumulates as to the intensity of feeling against free trade as it is now administered, and I once more repeat that I shall not be in the least surprised if our new democracy takes it into its head to go for a modified form of protectionism under the guise of fair trade. The taxation of raw materials, breadstuffs, &c., is repudiated by all the speakers on the subject, but it is quite certain that if protection be again given to manufactured goods the farmers will not be content to remain unprotected. It is by far the most serious issue of the time, and you may believe me when I say that it is quite on the cards that before very long the free-trade policy of Great Britain may undergo a marked change.

On the subject of

BELGIAN IRON AT GLASGOW

quite a "rumpus" is being kicked up, and that in a manner which reveals that fair trade has gained a strong footing even in Scotland. Mr. Cunningham, of Merry & Cunningham, the well-known ironmasters, let the cat out of the bag at an election meeting in Lanarkshire, and one of the Glasgow papers has pursued the theme with extreme persistency. It says: "The use of 2000 tons of Belgian iron, in place of 2000 tons of Glasgow iron, in the erection of the new municipal buildings involves more than the assertion of a principle of business, followed for the most part in our daily business intercourse with each other—the butcher buying from the grocer who buys from him. But in a season of sore distress commercially, and with winter closing in upon us, the act, in its consequences, is one of sheer atrocity. It is not merely a denial of so much employment to so many Glasgow wage-earners entitled to that employment, but it is the giving of that employment to Belgians. It is more. The making of these 2000 tons of iron would roughly have distributed as wages among iron and coal miners, and furnacemen, puddlers and laborers, a sum ranging from £3000 to £10,000; and the presumption is a fair one that this £3000 to £10,000 will have to be made up in rates and donations and soup kitchens by the general public."

When a wrong is done the right thing is to make amends. The right thing is to repair the evil, and if this is not done the ratepayers may take counsel to determine the course to be pursued. Presumably, here is a sum of from £3000 to £10,000 to be wantonly imposed upon charitable persons and the ratepayers. Such a transaction occurring with honorable men in private life would be dealt with summarily. In private life an honorable man would not attempt sneaking out, but would make frank acknowledgment of his error, and very likely, in addition, he would cast the thing away. We will not ask the Town Council to do likewise, to withdraw the objectionable Belgian ironwork from the municipal buildings, but it might be suggested to the Glasgow ratepayers, as to the Glasgow workers in the iron industries, that the sum paid past those workers in the iron industries should be made good personally by the members of the Town Council as a coal, clothing and soup kitchen fund. The workers in the iron industries, although poor, are entitled to be fairly dealt by. This £3000 to £10,000 having been unfairly kept from them, they are entitled to receive it, and obviously it would be immoral to seek to shift the obligation to the shoulders of the Glasgow ratepayers.

These remarks have been much applauded by the local iron men and have provoked quite a voluminous correspondence. Many of the writers of these letters are working-men, and the tone of their epistles affords proof of the bitterness they feel on the subject. The whole issue, indeed, is their own, and, once they know it, I fear they will go for very extreme measures.

Another illustration of the tendency of the times is given in the following excerpt from the London correspondent of the Liverpool Journal of Commerce: "In London docks this week were rows of elm coffins from Germany filled with lucifer boxes. Not far from them were doors, window frames, and house fittings from the same country. From a ship close by they were discharging pickaxes from the United States, wrapped in paper, the freight per pick being 1½d. A working man looking on said, 'Them picks are not much account. Handles are good, but the iron is bad; but as coffins are provided they may serve to bury English carpenters, who will no longer be wanted.' Of course the matches came from Sweden, and not Germany, but that does not affect the argument."

THE IRON MARKET

is again without any change worthy of note, and seems likely to remain in a quiet and perhaps invertebrate condition during the remainder of the year. At Glasgow warrants have been quiet and nominal in value, closing at 42/8 ½ ton. Scotch makers' brands are not generally changed, but some of them are 6d. ½ ton easier on the week. Last week's shipments were rather better, but there is a heavy comparative deficiency to date this year, while stocks are increasing so rapidly that they will soon surpass any former quantity. At Middlesbrough the market is lifeless, and prices are based upon 31/9 @ 32/ for No. 3 foundry pig. Shipments to foreign destinations are necessarily decreasing, while the local consumption is only limited. West Coast hematite pigs are dull at about 42/6 for mixed numbers in usual proportions. Shipments of these pigs have decreased by 79,420 tons this year, while the stocks in the stores only, apart from makers' own stocks, have increased by 34,801 tons, being now 98,000 tons. There are 38 furnaces in blast in the district, as against 49 a year ago. In the other smelting districts matters are unchanged, with rather more pig iron than can be readily sold, save by "shading" nominal current quotations. In the heavy branches of the manufactured-iron trade there is a fair amount of employment on bridge and general structural work. Fencing work remains weak, and orders are being taken at exceptionally low rates. Galvanized iron is as of late, with a considerable output, but rather irregular prices. Ordinary finished iron is dull and irregular, albeit there is a tolerable demand for common bars, angles, &c. Common Welsh bars are about £4. 10/; and North country £5 @ £5. 2/6 ½ ton; angles and tees, £5; nail rods, £5. 10/ @ £6; common hoops, £5. 12/6 @ £5. 15/; ordinary sheets, £6. 10/ @ £6. 15/; good sheets, £7 @ £7. 10/; and plates, £5. 10/ for ship to £8. 10/ for superior sorts. Old materials are unchanged, and there is only a small demand from the United States—indeed, other markets are better buyers. Freights are nominally unchanged, pig iron by ordinary steamers, Glasgow to New York, being easy at 1/ @ 1/6 ½ ton. As to the British Channel ports, Edwards, Robertson & Co., Cardiff, advise me: "The quantities of tin plates have considerably increased as compared with the shipments of the previous months. The exports have, however, been almost entirely confined to this merchandise. Freights still remain low, with no sign whatever of an upward tendency, room being easily procured for the northern ports at 7/6 ½ ton. A large number of steamers are still going forward to the southern ports in ballast. Room could be obtained at low rates. However, nothing has so far gone forward in that direction."

Steel is in moderate demand only as regards the older Sheffield sorts, but there appears to be a good call for Bessemer and Siemens materials in various shapes. In connection with the sleepers question it is of interest to learn that the Midland Railway Co. have given out an order for 5000 sleepers, which will mean about 250 tons, to a Welsh concern. The order has been taken by the Tredegar Works, where such sleepers have been rolled for some time past. That concern, indeed, has made over 3000 tons for the India Office, besides various small parcels for South America, and is now engaged on a further large order for India. Tredegar can turn out these sleepers complete at the rate of 4500 tons a week. Steel sleepers are also rolled on the West Coast and at Eston, and the Darlington Steel and Iron Co. are laying down pressing machinery, which will be ready for work in about six weeks, capable of turning out about 350 tons weekly of stamped or closed-ended steel sleepers of the Indian pattern. Steel rails are about as of late. The Great Eastern Co.'s order has been divided between Bolckow, Vaughan and Co., Cammell & Co., Samuel Fox & Co. and the Barrow Co., who each get 5000 tons. The fish-plates for the same railway company have been ordered from the Darlington Steel and Iron Co. at a price slightly lower than that of the association. The order for the colony of Victoria is reported to be not settled finally, but there are good reasons for supposing that the whole of the 40,000 tons will go to Krupp's. The deliveries of rails, &c., to the Argentine Republic have been made by Cammell & Co. on an old contract, while the Barrow Co. have lately sent off 5000 tons to Entre Rios. From Blaenavon another lot of 5000 tons is about to be shipped for the Central Argentine Railway. Messrs. Crawshaw have also been delivering to the same country.

SCOTCH PIG IRON

is quiet, but rather better in price for some extraordinary reason, which is certainly entirely unconnected with the real condition or prospects of the trade. Possibly rather better shipments last week may be the excuse. There are now 91 furnaces in blast in Scotland, as against 95 a year ago. In Connal's stores there are 637,453 tons (an increase of 2955 tons last week, and the largest stock ever held within 100 tons), compared with 579,886 tons a year ago. Shipments to date are 88,089 tons behind, while the imports from Middlesbrough are 93,862 tons ahead. Current prices are:

Deliverable alongside.	No. 1	No. 3
Garnthorpe, at Glasgow.	43/6	43/6
Cottbus, " "	43/6	44/
Langloan, " "	47/	44/
Summerside, " "	47/6	48/

Paris, 1878.

**McCAFFREY & BRO.,**

PENNSYLVANIA FILE WORKS,

Philadelphia, Pa., U. S.

For Superiority.



Manufacture and keep in stock a full line of **FILES** and **RASPS** only, for which we claim special advantages over the ordinary goods, and ask domestic and foreign buyers to allow us to compete for their trade.

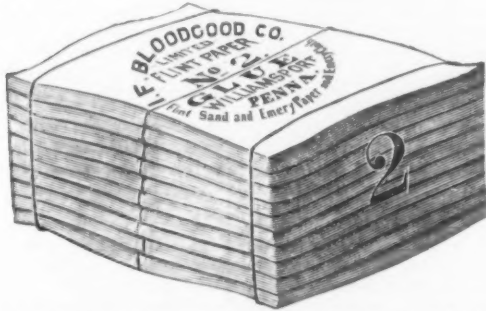
Superiority acknowledged wherever used, sold or exhibited.

I. F. BLOODGOOD COMPANY, Limited,

WILLIAMSPORT, PA.,

MANUFACTURERS OF

**Flint, Garnet and Emery Papers,
Emery and Crocus Cloths.**



We strictly guarantee our quality as equal to any make in market.

FOR SALE BY OUR AGENTS,

JOHN H. GRAHAM & CO.,

113 Chambers Street, NEW YORK,

AT LOWEST FACTORY PRICES.

LIGHTNING HAY KNIVES. WEYMOUTH'S PATENT.

This knife is the best in use for cutting down hay and straw in mow and stack, cutting fine feed from bale, cutting corn stalks for feed, cutting peat and ditching marshes. The blade is best cast steel, spring temper, easily sharpened, and giving universal satisfaction. A few moments' trial will show its merits, and parties once using it are unwilling to do without it. Its sales are fast increasing for export as well as home trade, and it seems destined to take the place of all other Hay Knives. They are nicely packed in boxes, one dozen each of 50 pounds weight, suitable for shipping by land or water to any part of the world.

MANUFACTURED ONLY BY

HIRAM HOLT & CO., East Wilton, Franklin Co., Maine.

For sale by the Hardware trade generally.

CAUTION:

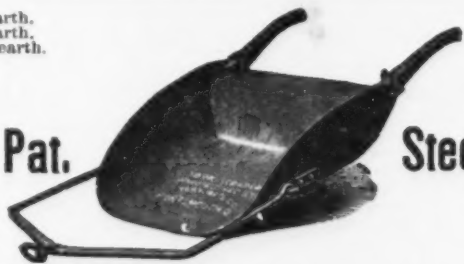
We are informed that various parties are infringing upon the widely known Letters Patent granted originally to George F. Weymouth, for an improved Hay Knife. The characteristic feature of the invention is a curved blade, provided with saw-tooth cutters, and furnished with suitable working handles. It is our purpose to prosecute all infringers of our patent, and we have already commenced one suit, which is nearly ready for hearing, and are about commencing suits against other parties. All manufacturers are hereby warned of our rights, and the public are cautioned against purchasing any Hay "Saw Knives" which are not of our genuine manufacture.

HIRAM HOLT & CO.

EAST WILTON, May 26, 1884.

No. 1 Carries 7 feet earth.
No. 2 Carries 5 feet earth.
No. 3 Carries 3 1/2 feet earth.

PATENTED
December 27th, 1881.
Runners Patented
February 11th, 1884.

The York Pat.**Steel Scraper.**

The Lightest and Strongest Scraper made. The body is made of one single piece of steel. The handles are fastened inside of fold, and free from all obstructions. The body, ball and runners are all made of steel. Especially suited for contractors. Send for circulars. Manufactured by

THE YORK MFG. CO., Limited, Portsmouth, Ohio.**RIPLEY & BARTLETT, TACKS**

MANUFACTURERS OF

Swedes and American Iron Tacks of All Kinds.

Having lately withdrawn from the combination, we are at liberty to make such terms and prices as we think expedient. Quality guaranteed the best in the market. Any variation from regular sizes and shapes made to order from samples.

WORKS AT
PLYMOUTH,
MASS.

**D. S. JENKINS, BROCKTON, MASS.,
TACKS, BRADS, ETC.**

Being the largest concern outside the combination, we are prepared to supply the Trade with a full line of goods. All goods made from best of stock. Satisfaction guaranteed. Samples sent free. Send for price list. Goods delivered in Boston, New York, Philadelphia, Baltimore and Chicago.

TACKS & WIRE NAILSBOSTON SALESROOM,
70 Portland St.BALTIMORE SALESROOM,
73 German St.NEW YORK SALESROOM,
116 Chambers St.**AMERICAN TACK CO., Fairhaven, Mass.****Nicholson
FILES.**

Bandsaw Files,
Boot Heel,
Brass,
Cabinet,
Cant,
Cotter Taper,
Cotter Equaling,
Cross or Crossing,
Doctor,
Drill,
Feather Edge,
Finishing,
Flat,
Flat Equaling,
Flat Wood,
Gang Edger,
Ginsaw,
Gulleting,
Half-Round,
Half-Round Wood,
Hand,
Hand Equaling,
Handsaw Blunt,
Handsaw (Double-End),
Handsaw Taper, single-cut,
Handsaw Taper, double-cut,
Handsaw Taper, slim,
High Back,
Hook-Tooth,
Knife,
Knife Blunt,
Lead Float,
Lightning,
Machine Mill,
Mill,
Mill Blunt,
Mill Pointing,
Pillar,
Pitsaw,
Reaper,
Roller,
Round,
Round Blunt,
Slotting,
Slim Handsaw Taper,
Square,
Square Blunt,
Square Equaling Files,
Stave Saw,
Three-Square Files,
Three-Square Blunt Files,
Tumbler Files,
Union Cut,
Warding Files,
Warding Blunt File,
Warding Round Edge File,

RASPS.

Baker's
Beveled Edge,
Bread,
Cabinet,
File, Flat and Half-Round,
Flat Shoe,
Flat Wood,
Half-Round Shoe,
Half-Round Wood,
Horse, Plain and Tanged,
Horse Mouth,
Jig,
Oval or French Shoe,
Racer, Plain and Tanged.

SPECIALTIES.

Butchers' Steels, Improved,
Bent Rifflers, Handled,
File Cards,
File Brushes,
Machinists' Scrapers,
Stub Files & Holder, detachable,
Surface File Holder,
Vise File Holder.

**NICHOLSON
FILE CO.,**PROVIDENCE,
R. I.,

SOLE MANUFACTURERS.

BLACK DIAMOND FILE WORKS.

TRADE

MARK.

**G. & H. BARNETT,**

21 to 43 RICHMOND STREET, - - - PHILADELPHIA.

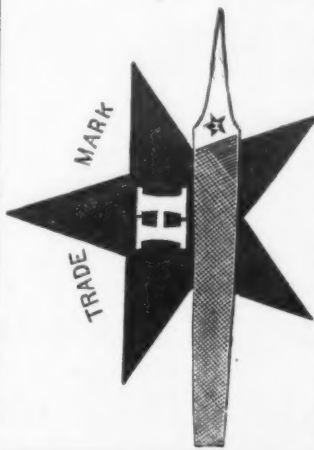
CHARLES B. PAUL, MANUFACTURER OF HAND CUT FILES,

Warranted Cast Steel.

187 Tenth St., Williamsburgh, N. Y.

All descriptions of Files made to order. Price List mailed on application.

Established 1863.

THRIFT FILE WORKS,
Manufacturers of all kinds of
FILES, RASPS.

CHRISTIAN HENNSLER,
428, 430, 432 & 434 Ireland St., PHILA., PA.
HERRING & SWEASEY, Agents in New York, 102 Chambers St.

**McClellan
File Co.,**

113 So. Water St.,

E. Saginaw, Mich.

ROEBUCK'S PATENT
**WOOD AND RUBBER
WEATHER
STRIPS.**

S. ROEBUCK, Sole Manufacturer,
164 Fulton Street, NEW YORK.

HELLER & BROS., Newark, N. J.,

Manufacturers of the

Celebrated American

HORSE RASPS AND FILES,

Made of solid best CLAY CRUCIBLE CAST STEEL of our own manufacture, and warranted to be unequalled in the market. For sale by Iron and Hardware dealers throughout the United States and Canada.

**J. M. KING & CO.,**

WATERFORD, N. Y.

Manufacturers of the

Button's Pat. Wire Cutter and Plier Combined.

Specially Adapted for Use on Wire Fence.

Also Manufacturers of BLACKSMITHS' STOCKS and DIES, PLUG and TAPER
TAPS, HAND, NUT and SCREW TAPS, PIPE TAPS and REAMERS.

Price List on Application.

Established by DANIEL B. KING, 1829.

**LIGGETT SPRING AND AXLE CO., LIMITED,
Ssprings and Axles**

MANUFACTURERS OF

For Coaches, Phaetons, Buggies, Wagons, &c

PITTSBURGH, PA.

UNION FOUNDRY AND PULLMAN CAR WHEEL WORKS,

N. S. BOUTON, President.

CORRESPONDENCE SOLICITED AND ESTIMATES MADE ON

HEAVY MACHINERY, AND ALL SIZES OF FLY WHEELS, PULLEYS, &c.

Special Machinery for Grain Elevators, Grain Steam Shovels, &c., contracted for. Car Wheels
and Car Castings at lowest rates.

Office, First National Bank Building, CHICAGO.



**RIEHLÉ BROS.
STANDARD
Scales
AND
TESTING
MACHINES**

Philadelphia, 50 South Fourth St.

New York, 115 Liberty Street.

AGENTS
HOWARD CHILDS & CO.

514 Smithfield St., Pittsburgh.

C. I. WICKERHAM.

175 Dearborn Street, Chicago.

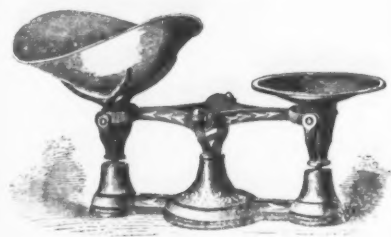
Tests of Materials made daily
at the Works, and certificates
furnished. Reports copied and
kept confidential.

GARRY IRON ROOFING COMPANY
Largest manufacturers of Iron
Roofing in the world. Manu-
facturers of all kinds of
IRON ROOFING
Crimped and Corrugated Siding,
Iron Tile or Shingle,
Fire-Proof Doors, Shutters, &c

**IRON ORE PAINT
AND CEMENT.**152-156 MERWEE STREET
CLEVELAND, O.Send for Circular and Price
List No. 15.

SCALES

Of All Descriptions



FOR

Grocers' & Family Use.

Manufactured by

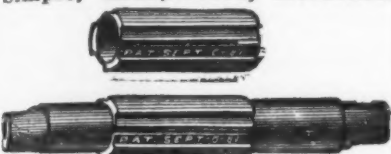
JOHN CHATILLON & SONS,

89, 91, 93 Cliff Street, New York.

Send for Illustrated Price List.

WILDE'S PATENT Expanding Mandrel

IS THE MOST PERFECT NOVELTY OUT. Simple, Inexpensive, Accurate.



COOKE & CO.,

22 Cortlandt Street, NEW YORK.

Sales Agents and Dealers in

GENERAL MACHINERY AND SUPPLIES

FOR Manufacturers, Mills, Mines, Railroads and Steamships.

Engines, Boilers, Pumps, Blowers, &c.

Write for circular and mention this paper.

WILLIAMS, WHITE & CO.,

Moline, Ill.



Drop Presses, Justice Hammers, Bending Machines, Punching and Shearing Presses.



J. M. STUTZMAN,

181 William St., New York,

Steel Alphabets

DIE LETTERS FOR SEAL ENGRAVERS,

BRANDS, SEALS,

POST-OFFICE STAMPS,

Door Plates,

Steel Stencil-Cutting Dies,

Soap Moulds and Brass Stamps.

SEND FOR PRICE LIST.

A NOVELTY IN SHOVELS.

MAYNARD'S

PATENT SOLID CAST STEEL SOCKET

SHOVELS AND SPADES.

Forged from a single piece of Cast Steel, without welding. The best, strongest and handiest ever made. For sale by

GEO. W. BRUCE,

1 Platt Street, New York.

THE

Humphries Mfg. Co.,

MANSFIELD, OHIO,

Manufacturers of

Iron, Brass and Brass-Cy-

linder Clusters, Pitcher,

Well and Force

PUMPS.

Windmill, Boiler Feed

Horizontal and Rotary

Pumps.

Hydraulic Rams, Iron

and Brass

CYLINDERS

of every description,

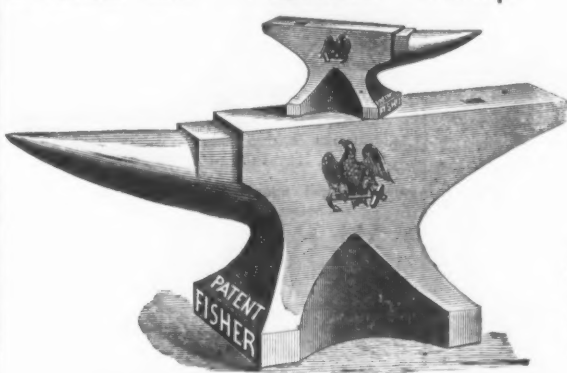
and other

HYDRAULIC MACHINERY.

ESTABLISHED 1843.
MORE THAN 200 DIFFERENT PATTERNS.

None Genuine without our Trade-Mark.

EAGLE and "FISHER" Stamp.



WARRANTED BETTER THAN THE BEST ENGLISH ANVIL

Face in one piece of BEST TOOL CAST STEEL, PERFECTLY WELDED, perfectly true, of hardest temper, and never to come off or "settle." Horn of tough untempered steel, never to break or bend. Only Anvil made in United States fully warranted as above.

FISHER DOUBLE-SCREW VISE

IS FULLY WARRANTED STRONGER THAN ANY OTHER LEG VISE, AND ALWAYS PARALLEL. Is the best Vise for Machine Shops and Blacksmiths, and for all heavy work. ACCURATE AND DURABLE. Send for Circular.

EAGLE ANVIL WORKS,

TRENTON, N. J.

HARTMAN

Profit and Protection to Hardware Men Handling

The Hartman Bale Tie.

SEND FOR SAMPLES AND PRICES.

HARTMAN STEEL CO., LIM'D,

BEAVER FALLS, PA.

Western Office: 53 Dearborn St., Chicago. Boston Office: 74 India St. New York Agency: 88 Chambers St. Branch Office: 48 Fifth Ave., Pittsburgh.

COVERINGS.



Made in sections three feet long to fit every size of pipe. Absolutely Fire-Proof—Light, Cheap. Can be applied by unskilled labor.

The Celebrated Patent Air Space Covering for Steam Boilers and Pipes, Hot Blast Piping, &c.

Asbestos Materials, Fibre, Millboard Packing and Cement.

Address CHALMERS-SPENCE CO.,

113 FIRST AVE., PITTSBURGH, PA. 419 & 421 EIGHTH ST., NEW YORK.

STANLEY RULE & LEVEL CO.,

MANUFACTURERS OF IMPROVED

No. 45. Adjustable Beading, Rabbit and Slitting Plane. \$8.00.

CARPENTERS' TOOLS.

FACTORIES:

NEW BRITAIN,

CONN.

WAREHOUSES:

29 Chambers Street,

NEW YORK.



THE

PERFECT CARPET STRETCHER

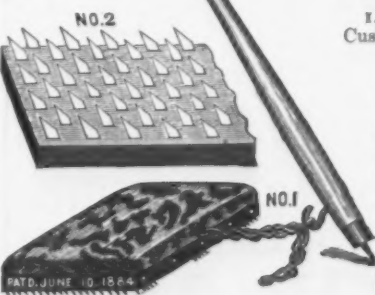
1. Represents Stretcher ready for use, also the Cushioned Knee Rest; Block, 5 x 8 inches.
2. One inch full-size section of convex wire. The only stretcher that receives the recommendation of the entire trade.

It has over 400 convex steel points, 3-16 inch long, set in leather, that are inserted into the carpet, therefore cannot injure it. It is neat, durable, convenient, and sells on its merits. It is the only upholstered Stretcher made.

EVERY STRETCHER WARRANTED.

Price, \$1.00. Liberal Discount to Trade.

SHAFFER & LORD, Mfrs., La Porte, Ind.



"CHAMPION" LOCKS.

PREMIUMS AND MEDALS:

"Centennial," 1876.

Melbourne, 1880.

Franklin Inst., 1883.



No. 695.

Padlocks, Night Latches;

Drawer, Closet and Chest Locks; Store

Door Locks; Combination Locks for

Drawers, Desks, &c. Keyless Cash Boxes.

FAIRBANKS & CO., Agents,

New York, Philadelphia, Baltimore, Pitts-

burgh and Buffalo.

Calder, "	51/6	48/6
Carnbroe, "	45/	42/9
Clyde, "	45/9	41/
Monkland, "	42/9	39/6
Quarter, "	41/6	39/6
Govan, at Broomielaw,	42/	39/6
Shotts, at Leith,	47/	46/
Carron, at Grangemouth,	51/	47/
Kinnell, at Bo'ness,	45/6	43/
Glenarnock, at Ardrossan,	45/	41/6
Eglington, "	41/6	38/6
Dalmellington, "	42/6	40/

MIDDLESBORO' PIG IRON

is very weak and quiet at the subjoined nominal quotations for G.M.B., f.o.b. at makers' wharves, in the Tees, less 2 1/2 % for cash:

No. 1 Foundry,	34/6	Mottled,	30/9
" 2 "	33/6	White,	30/6
" 3 "	32/	Refined metal,	50/
" 4 "	31/6	Kentledge,	35/6
" 4 Forge,	31/	Cinder,	30/

HEMATITE PIG IRON

is quiet at about 42/6 3/4 ton for mixed lots in usual proportions. It is reported that orders for lots of 500 to 700 tons have been received from the United States. West Coast brands are as below:

Cleator,	No. 1.	No. 2.	No. 3.
Lonsdale,	44/	43/9	42/6
West Cumberland,	43/6	42/	42/6
Lowther,	43/	42/6	42/
Distington,	43/	42/6	42/
Harrington,	44/6	43/6	42/
Solway,	43/	42/6	42/
Maryport,	43/	42/6	42/

TIN PLATES.

In London this market remains very quiet, and perhaps a trifle weaker than it was a week ago. The American buyers are either purposely holding off the market or have fewer orders to give out just now than usual, and in nearly every other market, including the home trade, there is no disposition to give out new orders to any extent. This is about the time of year when makers usually expect an improved demand, and therefore the absence of all activity up to the present is not encouraging to them. So far, however, the majority of the works are pretty well employed, and it is only a few firms who are willing to make concessions in their quotations. I quote good ordinary brands 10 cokes, 14/ @ 15/, f.o.b. Liverpool. At Liverpool the publication of last month's figures as regards shipments and stocks at the end of the month has not tended to improve the state of the market; on the contrary, it has made it more depressed than ever. It appears that the shipments of tin andterne plates during last month were the heaviest for many months past—approaching 300,000 boxes. And yet with such a large number as this exported there has been an actual increase in the stocks to the extent of 26,000 boxes—that is, comparing the quantity in the various depots on the 2d inst. that with what were there on the 1st ult. It must be also borne in mind that the quantity on the date last mentioned was 46,000 boxes in excess of what was in stock on September 1, making a total increase in stocks of 72,000 boxes. There had been a steady decrease in stocks from May or June to September to the extent of above 100,000 boxes. Now it will be seen that the increase during the last two months has almost neutralized the good effect of the first few months' reduction in make. There is another cause for the tin-plate market being depressed at present in the fact that very many of the persons now pressing their plates on the market and seeking for orders from buyers need not be in that position if they had accepted the business in hand here and for which orders were offered a couple of months ago at moderate prices. The inquiries have been but few this week, and not many orders of any sort offering. What there has been doing was of a special kind, not much of the ordinary sorts usually being asked for, the "bear" sales of these which were recently made having satisfied many buyers' requirements. Coke tins have been sold as low as 13/9 @ 14/ IC, and it is difficult to get 14/3 @ 14/6 for steels now.

THE HARDWARE TRADES.

In London, taking business all round, there hardly appears to be quite so much doing as was the case a few weeks ago. Still the home trade is better than it was two months ago, and some of the firms who have the enterprise to introduce and push new and attractive as well as cheap patterns of goods have been booking some very fair lines of late. The foreign trade, as a rule, is quiet and without any specially encouraging feature, but some of the colonial markets, notably those of Australia, continue to furnish a steady amount of work for various hardware commodities. At Birmingham there are fewer complaints of trade now than there were a month ago, though the grumbling about prices continues in all but a few favored industries. The requirements of the leading home markets are on a fairly satisfactory scale just now, and in more than one quarter indications of failing stocks are apparent, more particularly in furnishing goods, culinary utensils and the cheaper descriptions of gas fittings. At Sheffield the political campaign is now obviously curtailing business in the home market, travelers reporting that they find shopkeepers loth to order on the usual scale so long as public attention is so powerfully diverted from domestic and personal matters. The influx of season orders is consequently smaller than usual, but manufacturers fully expect that something in the way of compensation will be obtained by a largely increased demand next month. The silver-plate and cutlery houses, and in a less degree the stove and fender manufacturers, are making progress toward active employment. For nearly all goods outside domestic consumption, however, the demand is extremely limited. Steel, files, edge tools, saws and similar productions are selling slowly. The heavy forging, rolling and casting establishments are generally very short of fresh orders, but the firms who have lately laid themselves out for Government work in the way of ordnance and naval requirements are, in these special departments, well employed.

American Versus Krupp Steel Tires.

At the regular monthly meeting of the New England Club, in Boston, Mr. Leach, of the Nashua Steel Works, said, as reported in the Railroad Gazette:

A fair statement of the comparative wear of American and Krupp's tires cannot be obtained, because American tires have not been in use long enough to get into the same general use as Krupp's tires. Many master mechanics put Krupp's tires on their passenger engines and American tires on their freight and switching engines. Tires will wear faster in switching than in freight service, and faster in freight service than in passenger service. No fair comparison can therefore be made between Krupp and American tires—Krupp's tires placed where there is the least wear and American tires where there is the most. I wrote lately to the three American tire manufacturers, asking for any certificates giving the comparative wear of Krupp's and of their own make of tires. One firm replied that they had no such statistics, though they had tried to get them. Another manufacturer gave no answer. From another I received a letter which I will read. This is no place to peddle wares, and therefore I will only speak of American tires, without specifying the make. The following is a letter from Mr. Hewitt, of the Missouri Pacific, to the Baldwin Locomotive Works: "The accompanying tracing shows the condition of the flanges of front and back driving tires of Consolidation engine No. 826, originally No. 126. We think these flanges are good, considering the kind of engine and the 60,388 miles run. The left forward flange is worn more than the others, which is accounted for by the center-pin for truck being a little out of center on the engine. The other Consolidation engines have flanges in better condition, as there is less difference between the right and left side." The blue print shows the original condition of the tire and the wear after running 60,388 miles. This is 1/4 inch, making more than 15,000 miles to 1/4 inch wear. Some of these engines had Krupp and some American tires. In answer to further questions I received the following letter: "Some time ago the Baldwin Locomotive Works built some engines for the Savannah, Florida and Western Railway, on which the railway company paid \$100 extra per engine to have Krupp's tires, but they reported in January that our tires on the same engines were doing nearly as well. About three years ago the Wabash, St. Louis and Pacific put a set of our tires on one engine and a set of Krupp's on another of the same class, and ran them in the same service, and at last reports, if there was any difference in the wear of the tires, it was in favor of ours. Up to the early part of this year our tires made 16,350 miles to 1/4 inch wear on Cooke Consolidation engines weighing 107,000 pounds." The master of machinery, Central Pacific Railroad, replies: "I have used the American tire ever since it was first manufactured, and I consider it far superior to the Krupp's or any other imported tire." The general average of all American tires on the Wabash, St. Louis and Pacific from January 1, 1880, to January 1, 1882, was 9704 miles to 1/4 inch wear; and of all Krupp's tires for the same time 7516 miles.

Mr. Griggs, of Providence and Worcester Railroad, then read the following statement, showing the wear of driving tires in freight service, no driver brakes being used. All engines are precisely similar; cylinders, 18 x 26; total weight, 82,000 pounds; original thickness of tires, 3 inches.

Make of tires	Standard	Krupp	Krupp
Present thickness	1 1/2 in.	1 1/2 in.	1 1/2 in.
Total number of miles	248,007	168,772	181,105
Number times turned	6	5	8
Average mileage each turning	40,501	33,754	60,368
Average thickness taken off each turning	0.229 in.	0.300 in.	0.396 in.
Greatest mileage between turnings	56,702	51,127	62,895

Mr. J. N. Lauder, of Old Colony Railroad, said: As none of the engines had driver brakes, the wear is in actual service in pulling trains. The statements that I read at our last meeting, from a certain road, which I will not name, were entirely different from the results that Mr. Griggs gets on his road. I am very glad to hear that the American tire makes so good a showing, because I am thoroughly American in my feelings. I do not want to use a foreign tire unless we are forced to do it for economic reasons. I am very glad that these statements show that the American tire has given the most wear to a certain amount of reduction in thickness. I have been examining the blue print taken from the tires on the Consolidation engines, and they show a remarkable wear of over 15,000 miles per 1/4 inch. The service on a Consolidation engine is very much lighter, however, than on an eight-wheeler. I can get no such results from any tires on my road. On a Consolidation engine weighing upward of 100,000 pounds, the enormous distributed weight prevents the engine from slipping as much as an ordinary eight-wheel engine would with perhaps a good deal more weight on each driver, but a large proportion of weight carried on the truck. I believe that in freight service we should utilize all that weight now on the truck for traction. This matter has an important bearing on the question of car-wheels, as we are all using steel-tired car-wheels, and it is very important to know whether we are getting the best tires.

A spring-plate steel-tired car-wheel now manufactured by the Dickson Mfg. Co., of Scranton, Pa., is attracting attention among railway officers. In this wheel the rolled-steel tire is joined to the cast hub by two curved steel plates so shaped as to compose an elastic resistance in every direction in which strains and blows affect it. It is claimed that the tensile strength and elasticity of the metal in these plates form complete security against their breaking, and that the crystallization of axles is largely removed by the spring of the curves, which counteracts the effects of the vibrations. This wheel has been in use since June, 1884, and is now running on some of the largest Eastern roads.

A. & E. Albert, of Biebrich, Germany, have acquired the right from the Phoenix Steel Works, at Ruhrort, and the Meiderich Works of the Rheinische Co., to utilize the cinder produced by them by the basic Bessemer process for the manufacture of fertilizers. This cinder contains from 15 to 17 per cent. of phosphorus. Two works are to be built.

AMERICAN MADE RAZORS



J. R. TORREY & CO.,

MANUFACTURER OF

Strops and Dressing Cases.

IMPORTER OF FINE RAZOR HONES.

Wholesale Dealer in Cutlery.

FACTORY at Worcester, Mass. NEW YORK OFFICE 97 Chambers Street.

We make the largest and most complete line of Razor Strops ever offered to the trade, including every description and style known. Our Razors are the Standard for excellent cutting quality and elegance of finish, and our prices lower than foreign makes of similar grade. Our Toilet Sets and Dressing Cases are designed for practical use and are made in various attractive styles.

Send for Illustrated Price List—free to the Trade.

UNDERHILL, CLINCH & CO.,

94 Chambers Street, New York,

DEPOT FOR

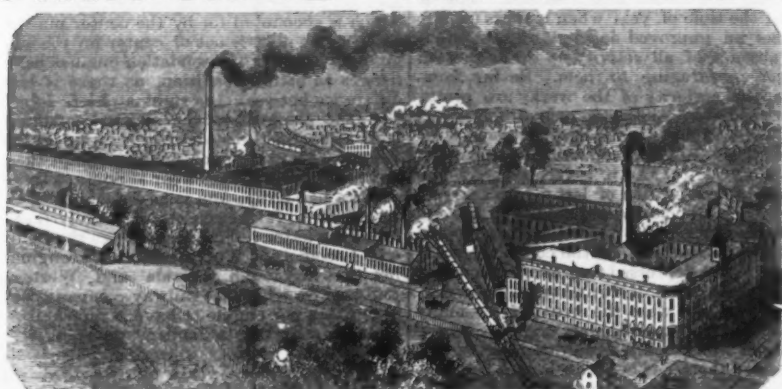
Nicholson File Co.'s Files.

Russell Jennings' Anger Bits.
Geo. Nelson & Co.'s Hatchets, Hammers, &c.
American Screw Co.'s Wood and Machine Screws,
Nuts and Tire Bolts, Rivets, &c.
Brady's Brick Trowels.

O. Ames & Son's Shovels, Spades and Scoops.
E. W. Gilmore & Co.'s Strap and T Hinges.
W. S. Batchelor's Edge Tools.
A. Field & Son's Tacks, Brads, Nails, &c.

GENERAL HARDWARE.

CARRIAGE HARDWARE.



THE E. D. CLAPP MFG. CO., Auburn, N. Y.

THE LONG & ALLSTATTER CO.,

HAMILTON, OHIO: COR 4th AND HIGH STS.,

PUNCHES,
SHEARS
AND
HAMMERS.

Double, Single, Hor-
izontal, Twin Boiler,
Spacing Gate, Multiple
Angle, Bar, &c. Belt
and Steam Driven.

Send for Catalogue.

RICHARD DUDGEON,

No. 24 Columbia Street, New York.

Maker and Patentee of the Improved

Hydraulic Jacks
AND
Punches.

Roller Tube Expanders and Direct-Acting Steam Hammers.

Communications by letter will receive prompt attention.
Jacks for pressing on Car Wheels or Crank Pins made to order.

Wm. Rogers' German Silver and Plated Spoons and Forks. Send to SIMPSON, HALL, MILLER & CO.,

Wallingford, Conn., for Illustrated Catalogues. Branch Houses: 36 East 14th St., New York;

504 Commerce St., Phila.

Pa.; 100 State St., Chicago,
Ill.Factories:
Wallingford, Conn.

THE NORFOLK SHEAR CO.,

Manufacturers of the finest line of Steel-laid Shears, Scissors, Bent Trimmers,
Bankers' Shears, Button-hole Scissors and Dental Nippers. Also the best Steel-laid
Straight Trimmers for the money in the mar-
ket "New England." We pay particular
attention to hardening and tempering our
goods, and they can be relied on for possessing
superior cutting qualities. A fair trial of our
goods will convince of their merit.

SAMUEL A. HAINES, General Agent, No. 58 Chambers Street, NEW YORK.
Send for Illustrated Catalogue, with discount. Factory, NORFOLK, CONN.HOWE BROTHERS & HULBERT,
West Winsted, Conn.,

Manufacturers of

SHEARS

AND

SOLID FORGED STEEL

Scissors, Corkscrews and Hardware Specialties.

Clayton Brothers,

BRISTOL, CONN.,

Manufacturers of Cast Shears,
Screw Drivers, Kitchen Knives, Roller Skates, &c.
The Best and Cheapest in the Market. Send for Prices.

HAMMOND'S

Window Springs

Lock and support upper and lower
sashes—all sizes. Are very con-
venient, simple and durable. Sample
The trade free.W. S. HAMMOND,
Lewisberry, York Co., Pa.

Circulars give full instructions.

THE F. WILSON
Pat. Grinding Mill

FOR

GRINDING WET, GREEN, GREASY OR DRY BONES.

Send for Descriptive Catalogue and Price List.

WILSON BROS., Sole Manufacturers,
EASTON, PA., U. S. A.

The \$5 Hand Mill.

HAWLEY BROS. HARDWARE CO.,
301 to 303 Market St.,
SAN FRANCISCO, CAL.

Agents for the Pacific Coast.

CORPORATE MARK,



JOSEPH RODGERS & SONS'

(LIMITED)

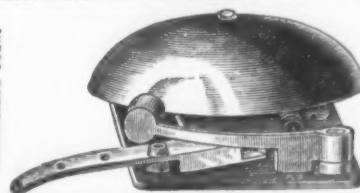
CELEBRATED CUTLERY,

No. 82 Chambers Street, New York.

F. & W. CLATWORTHY, AGENTS.

The demand for JOSEPH RODGERS & SONS' pro-
ductions having considerably increased, they have, in
order to meet it, greatly extended their Manufacturing
Premises and Steam-power.
To distinguish articles of JOSEPH RODGERS &
SONS' manufacture, please to see that they bear their
Corporate Mark.

Established 1836.



BEVIN BROS., MFG. CO., Easthampton, Conn.,
Manufacturers of
Sleigh Bells, House, Tea, Hand, Gong Bells, &c.

ESTABLISHED 1836.

ALFRED FIELD & CO.,

93 Chambers and 75 Reade Streets,

NEW YORK,

SOLE AGENTS FOR

Ely Bros., Caps, Wads, &c.; Joseph Elliot
& Sons, Razors; Isaac Greaves, Sheep
Shears, &c.; Robert Sorby & Sons,
Sheep Shears, &c.; Edward Elwell,
Hoes, &c.; R. J. Linacre, Grass
Hooks and Sickles; Webster &
Horsfall, Steel Wire.

General Agents Western File Co.'s

AMERICAN FILES.

HEADQUARTERS FOR

Anvils, Chain, Cutlery, Guns,

&c., &c., &c.

GEO. H. CREED,

SHIP CHANDLERY,

103 Reade Street, New York,

Manufacturer of and wholesale dealer in Cotton
and "Long Flax" Sail Duck, Cotton and
Linen Havens, Creed's Patent Ships' Crews, Hel-
man's Wire Rope Splicers. Agent for Raymond's
American Crane Oil, for lubricating Cylinders and
Valves.

Established in 1839.

A. G. COES & CO.

WORCESTER,

MASS.,

Successors to

L. & A. G. Coes,

Manufacturers of

THE GENUINE

COES

Screw

Wrenches.

PATENTED,

May 9, 1871.

December, 26, 1871.

December, 23, 1875.

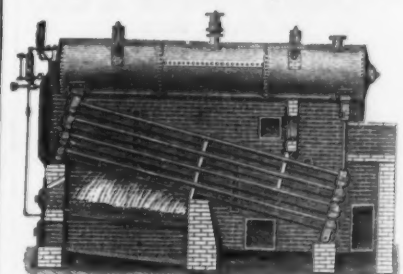
August 1, 1876.

The back strain when the wrench is used is
borne by the bar—not by the handle.
The strongest Wrench made, and the only suc-
cessful Re-enforced Bar.
None genuine unless stamped

A. G. COES & CO.

Our Agents, JOHN H. GRAHAM CO., 113 Cham-
bers St., New York, carry a full line of our goods,
and will be pleased to serve you at factory prices.

Water Tube Safety Boilers



(MOORE'S SYSTEM.)

Unequaled for durability, safety and economy.
Examinations made with ease. Cleaned quickly
and easily. Circulation rapid and sure.

National Water Tube Boiler Co.,

N. Y. ENGINEERING CO., 64 CORTLANDT ST.,

Circulars and Testimonials. AGENTS.

GEO. BURNHAM & Co.,

Worcester, Mass.,

Successors to

E. J. Worcester Drill Co.,

Manufacturers of

BLACKSMITHS'

UPRIGHT

Self-

Feeding DRILLS

HAND OR POWER.

Patented March 20, 1883.

Superior Design. Unrivalled Work-

manship. Latest Improvements.

Send for Illustrated Price List.

Hill Brothers & Co.,

Walsall, England,

Hardware, Saddlery and General

Merchants,

AGENTS FOR

BALL BROTHERS'

SHEEP SHEARS.

McCoy & Sanders,

SOLE AGENTS,

26 Warren Street, New York.

SHELF BOXES

SEND FOR CATALOGUE TO

JESSE JONES & CO.

615 Commerce St. Phila.

BROHARD'S SASH HOLDER

BEATS THEM ALL.

Best selling article ever offered to agents. Simplest,
most durable, most convenient. Holds other sash
firmly in any position desired. Does not deflect or
injure any part of the window. No holes, spurs or
other engaging devices in sash or window frame.
Better than weights. Attached to sash in a moment.
Send your address for circulars, or inclose 10 cents
for sample.

BROHARD & CO., Clarksburg, W. Va.

GEO. W. MONTGOMERY,
GEO. W. CHURCH,

105 Fulton St., New York.

Bemis & Call Hardware & Tool Co.



PATENT COMBINATION WRENCH.

Case-Hardened Throughout. Parts Interchangeable.

This Wrench not only combines the superior qualities of a
a Pipe Wrench but also
all the requisite combinations of a regular Nut Wrench, thus making a combination
which has no equal.



No. 3 PATENT PIPE WRENCH.

The serrated jaws of the Wrench are interchangeable; that is, the same serrated plate
may be used for either the stationary or sliding jaw, so that if one plate is broken another
can be furnished adapted to either jaw without express designation. The slides, nuts and
various parts are also interchangeable, thus easily repairing the Wrench at very small
expense, and with as perfect practicability for further use as when the Wrench was new.
For Circulars and Price List, address

BEMIS & CALL HARDWARE & TOOL COMPANY, Springfield, Mass.

No. 2.

Duplex Swing.

The popularity of the Duplex Swing in the short

time it has been introduced is phenomenal.

The Swing is constructed on original mechanical

principles. The frame is so interlocked as to be

prevented from sagging, even if the bolts are loose,

a feature not possessed by any other swing manu-

factured. There are two sizes manufactured, adapted

for both lawn and park. No. 1, or largest size,

has standards 6 feet to 8 inches long with a spread of

about 9 feet, and 5 feet in width. The frame work

is so constructed that by taking out two bolts the

standards will close up, and by taking out the bolts

of the two cross pieces the frame can be closely

folded ready for shipping. The Swing can be put

up or taken down ready for packing in 10 minutes.

The weight of the Swing is a little

less than 100 pounds. It is very

strong, having been tested by four

men whose weight aggregated over

500 pounds.

The No. 2, or parlor size, has stand-

ards about 3 feet long, and otherwise

proportioned in size, weighing less

than 75 pounds. They combine sim-

plicity of construction, beauty and

strength, and can be operated with

ease by small children in the swing

For Sale by all Leading

Dealers.

New York Agents, 100 Chambers St.

JAY-EYE-SEE

New Improved Patent Wire

CURRY COMB.

Lightest and best for general use. Most durable

Comb made. Most humane and only Comb fit to use on

a horse's legs, shoulders and flanks. It lifts every hair

and throws out the dirt. Rubs and cleans the skin, but

cannot cut or scratch it. It is without a rival for cleaning

a muddy or sweaty animal. A wonder on a shedding

horse. It cleans itself, and has an improved attachment

which cleans a brush with ease and rapidly. Send for

Circulars and Prices. Sample by mail, 50 cents.

MANUFACTURED BY

MUNCIE NOVELTY CO., MUNCIE, IND.

Maltby, Curtiss & Co., New York, Sole Agents.

HAIGHT & CLARK

ALBANY N. Y.,

MANUFACTURERS OF FINE GRAY IRON CASTINGS,

ORNAMENTAL AND ART CASTINGS

OF EVERY DESCRIPTION.

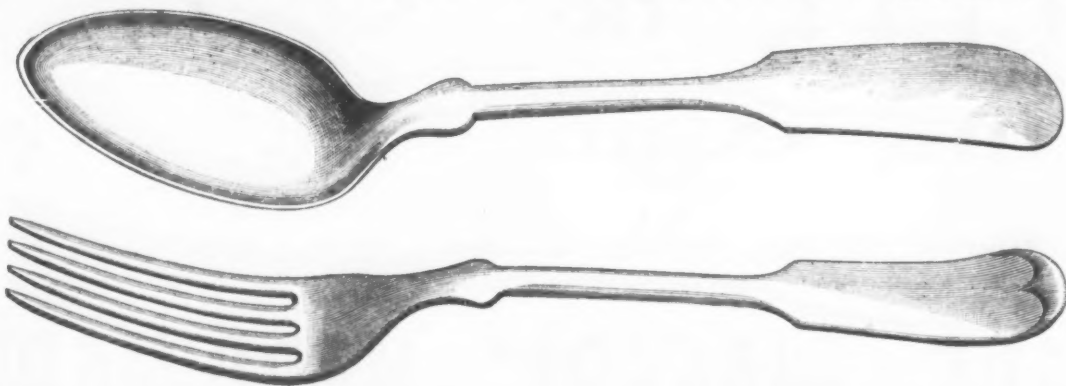
Baskets and Pickets for Wire Workers. Castings for Furniture and Piano Manufacturers. Stove and

Metal Patterns of all kinds a specialty. Correspondence solicited.

JAPANNING. NICKEL PLATING. BRONZING.

HALL & ELTON'S GERMAN SILVER

1837.

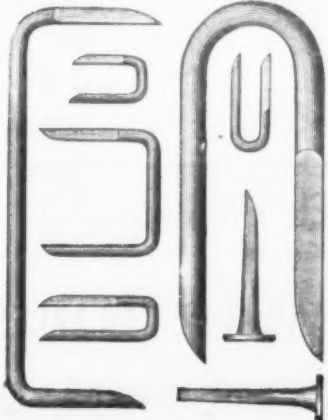


1885.

In addition to Spoons of this well-known brand, we are now prepared to furnish Forks of the same quality. We GUARANTEE these goods to be SOLID and of UNIFORM quality throughout, with no coatings to wear through or flake off, and with no liability to RUST.

HALL, ELTON & CO., Wallingford, Conn., and 47 E. 13th Street, New York

FLORENCE TACK CO.,
P. O. BOX 39, FLORENCE, MASS.,
Manufacturers of every variety of



TACKS, SMALL NAILS, DOUBLE-POINTED TACKS and STAPLES

Our STEEL CLINCH STAPLES will drive in harder wood of mortar than when made from iron. They can also be clinched as well as any soft iron staples.

AGENTS IN ALL FOREIGN COUNTRIES.



119 South Fourth Street, PHILADELPHIA.

Branch Office, 605 Seventh St., Washington, D. C.
H. HOWSON, Engineer and Solicitor of Patents.
C. HOWSON, Attorney at Law and Counsel in Patent Cases.
SEND FOR CIRCULARS.



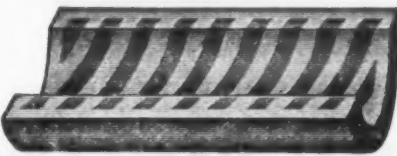
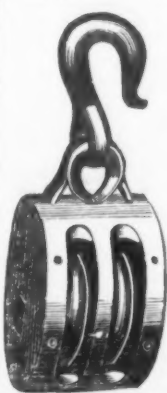
Coxhead's Patent Combined Saw Set and vise. Received award of Excellence at American Institute, 1884. The only tool in the market for setting circular, hand and band saws and holding them for filing. JOHN F. COXHEAD, Poughkeepsie, N. Y. Send for Circular.

W. H. McMILLAN,

113 South St. (Up-Stairs), bet. Peck Slip and Beekman St., New York,

Block and Pump Manufacturer.

Manufacturer of Inside Iron Strap and all kinds Tackle Blocks, Mast Hoops, Hanks, Belaying Pins, Hand Spikes, Hand Pumps, &c. Also Dealer in Lignumvitæ Wood, for Beam Faces and Roller Beds, &c.
Telephone Calls: Office, "Nassau 142," Factory, "Williamsburg 377."
Factory: 32 to 40 Penn St., Brooklyn, E. D.
Sole Agent for John Smalley's Graphite Bushings.
NO OIL REQUIRED.



Agent for Wilson Mfg. Co.'s Pat. Sheaves and Roller Bushings.

SHUBERT & COTTINGHAM,

MANUFACTURERS OF ALL KINDS

TACKLE BLOCKS.

Lignum-Vitæ and Iron Sheaves,

WITH Plain, Roller and Self-Lubricating Bushings.

Heavy Purchase Blocks

FOR Contractors, Builders, Railroad and Mining Use.

118 North Delaware Avenue,

Factory, Beach and Norris Streets.

PHILADELPHIA, PA.

SEND FOR CATALOGUE.

BAGNALL & LOUD BLOCK CO.,

BOSTON, MASS.,

MANUFACTURERS OF THE

CELEBRATED STAR BRAND OF TACKLE BLOCKS.

These goods can be obtained of the general hardware trade and of our

AGENTS
F. BALDWIN, 31 South St., New York.
J. F. LOVEJOY, 102 Chambers St., New York.
C. H. GURNEY & CO., 247 Lake St., Chicago.
BRODERICK & BASCOM ROPE CO., St. Louis.
BAUFGARDNER, WOODWARD & CO., Philadelphia, Pa.
UHLER & ENGLISH, Philadelphia, Pa.



Effect of the Enlargement of St. Mary's Canal.

The recent enlargement of the locks in St. Mary's Ship Canal, on the rapids below Lake Superior, so as to admit vessels drawing 16 feet, and several of them at a time, has had a marvelous effect on trade. A writer says:

Not only have freight rates fallen even more than half, but the tonnage passing these locks shows a tremendous increase over any previous year in this the first year of these completed improvements. To illustrate: If the same ratio of increase is continued through the balance of this season, there will pass through the canal going eastward alone over 2,700,000 tons of freight, or as much as the eight trunk lines of railroad took East from Chicago last year, the same being the products of our forests, fields and mines. The receipts of coal at the head of the lake have increased from 60,000 tons in 1880 to 600,000 tons in 1885. The receipts of wheat there have increased from 1,500,000 bushels in 1880 to 14,000,000 in 1884. The elevator and storage capacity increased from 540,000 bushels in the spring of 1880 to 9,400,000 bushels this year, and 3,000,000 more to be immediately built. As a wheat market it has grown from daily sales of a few carloads no longer ago than 1884 to a wheat market second only in amount of its daily sales to Chicago, with everything tending to show its daily wheat transactions will equal even that "modern marvel" in the coming year. That has built up there a busy population of some 20,000 from about 4000 in 1880.

Receipts of Montana shipments in 1884 at the head of Lake Superior for cheap water transportation East took marine insurance of about \$4,000,000, and so far this year shows a large increase over last year. Additional to this amount last year also saw the beginning of Montana cattle shipments to the improved waterway of Lake Superior, that in a near future will exceed the value what it may. This improved waterway has made possible the opening of the iron deposits of Wisconsin. Those of the Minnesota Iron Co., opened last year, will ship from their port of Two Harbors, 28 miles east of the head of the lake, some 250,000 tons, equal to 18,000,000 bushels of wheat. Freight rates from Duluth to alongside the ocean steamers or into elevators at New York were at an average rate this season of a fraction less than 6 cents per bushel and as low as 3½ cents to alongside ocean steamers at Montreal. A good proportion of grain that has left there this season has been carried to Buffalo, 1030 miles, for 1½ cents per bushel, or less than the usual elevator charges from cars to elevators.

New Alloy For Coating Sheet-Metal Surfaces.

An alloy for coating metal surfaces has been patented by C. E. Manby, of McKeesport, Pa. It is designed to be used on sheet metal surfaces and on pipes, wires and similar articles to prevent oxidation. The alloy is composed of 23 to 36 parts of tin, 1½ of 1 to 8 parts of antimony, 50 to 70 parts of lead and ¼ of 1 part of bismuth. The tin is first melted and heated to a dull-red heat, when the antimony is added either in a hot or cold state. The lead is next stirred in, and after these metals are thoroughly united the fire is withdrawn and the bismuth is introduced. It is said that this alloy will not oxidize or tarnish; that it is very ductile, and that it will retain a bright, silvery luster. In his specification the inventor contrasts the common galvanized coating and calamine coating with the new alloy in the following terms: "The zinc employed in galvanizing is so crystalline that it often breaks off in flakes, and so leaves the surface of the iron exposed. The most effective coating heretofore employed is the calamine alloy, which penetrates into the surface pores of the iron as though it had in turn entered into an alloy with the iron. The calamine alloy is, however, found to be soft, and will not resist much friction, and though it has a bright surface, it will in a short time tarnish and lose its bright luster, and while it is still effective to protect the metal coated from oxidation, yet this tarnished or leadened appearance of its surface renders it less marketable. The galvanizing process requires an exceedingly high temperature of the coating-bath, and while calamine requires much less, still, as it contains zinc, the temperature of the coating bath is high, and it is most essential to have the lowest possible temperature when using the wet process, for the reason that a high temperature causes too rapid volatilization of the prepared solution of soluble chlorides to separate it from the iron at the time it is being dipped into the metal, and consequently there is formed on the iron a thin film of oxide sufficient to prevent perfect success and the penetration of the alloy into the metal to produce the required effect. A high temperature of the coating-bath also in many cases blisters the metal coated."

As to the process of using the new alloy and the results gained, the inventor says: "In coating iron or steel with this alloy the articles to be coated—such as pipes, sheets, wire, &c.—are first scaled by the usual pickling process, and then subjected to the neutralizing or reducing bath, consisting of a saturated solution of chloride of zinc or chloride of tin. The articles are then removed to the metal bath and immersed therein, remaining until raised approximately to the temperature of the metal bath, and afterward they are drawn out and allowed to drain. The tin and lead forming the principal part of the alloy prevent oxidation, but it is essential to bind these two metals more strongly together, and this I find can be accomplished by the aid of antimony in presence of bismuth. Antimony also imparts to the alloy a hardness which properly enables it to withstand much severe wear and tear or unusual friction. Antimony also imparts to it and causes it to retain a silver-like luster, much more handsome than galvanizing. Antimony is also very electro-negative, and it aids in the presence of bismuth in neutralizing or reducing to a minimum galvanic action between the remaining heterogeneous metals, iron, tin and lead. The bismuth promotes fluidity of the alloy and lowers the temperature of the coating-bath, which condition is of the greatest importance, the low temperature being exceedingly desirable for reasons hereinbefore explained. The temperature of the bath is from 150° F. to 250° F., below that required for galvanizing, and about 100° F. below that required in coating with calamine alloy. The temperature of the alloy is indicated by its surface, so that it can be kept under complete control with a very little experience. When the proper temperature is observed there is no loss either by skimmings or oxidation. The coating formed by this alloy on iron or steel affords a superior protection to any heretofore known to me, as it forms a firm union with the metal coated and precludes oxidation or rusting of the article coated, and the alloy will not oxidize or tarnish, so that it retains its bright silvery luster when subjected to all natural waters for some considerable time. The coating is also remarkably ductile on account of the combination of these metals possessing properties of non-crystallization."

muth promotes fluidity of the alloy and lowers the temperature of the coating-bath, which condition is of the greatest importance, the low temperature being exceedingly desirable for reasons hereinbefore explained. The temperature of the bath is from 150° F. to 250° F., below that required for galvanizing, and about 100° F. below that required in coating with calamine alloy. The temperature of the alloy is indicated by its surface, so that it can be kept under complete control with a very little experience. When the proper temperature is observed there is no loss either by skimmings or oxidation. The coating formed by this alloy on iron or steel affords a superior protection to any heretofore known to me, as it forms a firm union with the metal coated and precludes oxidation or rusting of the article coated, and the alloy will not oxidize or tarnish, so that it retains its bright silvery luster when subjected to all natural waters for some considerable time. The coating is also remarkably ductile on account of the combination of these metals possessing properties of non-crystallization."

The Band-Saw versus the Circular Saw.

The *Manistee Advocate* gives an account of the work done at the mill of Filer & Sons, Filer City, Mich., with a band-saw which was built by the Stearns Mfg. Co., of Erie, Pa. In a letter Filer & Sons say:

We have not had any of the trouble we feared from saws breaking, getting off the wheels, cutting concave lumber, &c. The lumber has been as near perfect in manufacture as any we ever saw, and we give the band credit for making fewer bad cuts than any circular we ever used. We had read and heard of concave lumber being common to band mills, occasioned by the overthrow of the upper wheel, and were prepared to expect it from our mill, but we are happily disappointed in that respect, as there has not been a cut of that kind and no evidence of a tendency to overthrow. We use 16 gauge saws, 8-inch blade, teeth 1 inch from point to point, ½ inch long, E. C. Atkins's make, Indianapolis, Ind., and steam feed movement for our carriage, and cut about 24 M. feet per day of 10 hours, log measurement as given by Doyle's rule, cutting logs that average about four to the M. We are cutting deal as much as we can from the logs, which necessitates much handling of logs and resawing of the defective deals, and we should expect to do much better cutting the same logs 1 inch, 1½ and 1¾ inches and thicker, for the home market. (The deal are for foreign shipment.) The result of our day's work was as follows: 77 logs sawed and measured by Doyle's rule, making 26,338 feet, an average of 342.2 feet per log. The lumber measured from the 77 logs was 35,357 feet, board measure, and consisted of 17,283 feet of inch, 6923 feet 1½ and 1¾ inches, 1326 feet timber, 137 feet 2 inches, and 688 feet deal, making a gain in lumber of 34½ per cent. over log scale. During the day two logs were taken into the mill and sawed in succession, the two making 1911 feet; time consumed in sawing them, 10 minutes, about 100 feet a minute and at the rate of 60 M. or better for 10 hours. Of course exceptional cuts can be made that will be very large, but we consider a daily cut of 35 M. good fair work for the mill. The mill is running 225 revolutions per minute, which gives the saw travel about 6000 feet per minute, and we aim to carry an average of 12-inch feed. The band has many advantages over the circular, especially in large and good timber, and if brought into general use will result in extending the timber supply for generations to come.

Wisconsin Ore for the Bethlehem Company.

An experimental shipment of ore for the Bethlehem Iron Co. has been made recently in a manner which illustrates one of the many ways in which it is sought to obtain return freights. One of the large Lake steamers of the Lehigh Valley Transportation Co. was loaded with anthracite coal for Duluth from the docks of the Lehigh Valley Coal Co. at Buffalo. Freights on anthracite are sometimes lower to Duluth than to Chicago, because it is more difficult to get up loads to Duluth for the vessels coming down with grain. In this case the coal was discharged at Duluth and a deck load of flour taken on board. The run up to the terminus of the Duluth and Iron Range Road on the Lake is only about 40 miles, and there the cargo of iron ore was taken on board, and the steamer started on her return trip. To discharge the deck load of flour at Buffalo caused a delay of only a few hours, and the steamer then proceeded through the Welland Canal to Fairhaven, where the ore was discharged into coal cars which had delivered their freight on the dock at that place. The shipment was an experimental one, for the iron company had not yet fully tested the merits of the ore, but, if it should prove to be as good as it is claimed to be, the railroads and the transportation company can unquestionably make a rate low enough to enable frequent shipments by this route, the conditions for which are very like those for Marquette shipments, there being a large down traffic and but little up, so that very low rates are accepted for cargoes from Buffalo to Lake Superior ports.

The German Rail Export Trade.—The following figures show the fluctuations in the export trade in rails from Germany:

Year.	Metric tons.	Year.	Metric tons.
1860.....	1,270	1874.....	84,900
1862.....	3,730	1875.....	132,000
1864.....	5,350	1876.....	133,000
1866.....	2,000	1877.....	225,000
1867.....	4,300	1878.....	307,000
1868.....	28,600	1879.....	164,400
1869.....	37,100	1880.....	239,304
1870.....	36,000	1881.....	250,702
1871.....	41,900	1882.....	186,054
1872.....	70,700	1883.....	176,178
1873.....	70,700	1884.....	144,464

In 1881 45,531 metric tons of rails went to this country, 34,440 tons to Spain, 31,523 tons to Belgium, 16,865 tons to Italy and 10,588 tons to Switzerland. In 1882 the export to this country dropped to 9425 tons, in 1883 to 6335 tons, and in 1884 to 154 tons.

TRAVELING JIB AND PILLAR CRANES.

Weston's Patents. Any Capacity.

CAN BE OPERATED BY HAND OR POWER.

ARE ABSOLUTELY SAFE FOR OPERATOR AND LOAD.

Simple, Durable, Convenient and Economical.

USED BY THE BEST SHOPS AND FOUNDRIES. PLANS AND ESTIMATES ON APPLICATION.

THE YALE & TOWNE MFG. CO.,

Manufacturers Engineers and Machinists,

STAMFORD, CONN.

NEW YORK, 62 Reade Street,
BOSTON, 224 Franklin Street.

CHICAGO, 64 Lake Street.
PHILADELPHIA 15 N. Sixth Street.

CATALOGUES ON APPLICATION.

H. D. SMITH & CO.,

Plantville, Conn.,

MANUFACTURERS OF THE

BEST QUALITY CARRIAGE MAKERS' HARDWARE,

Manufacture the Largest Variety of Forged Carriage Irons, of Best Material and Workmanship.

PRICES LOW FOR QUALITY OF WORK FURNISHED.

SEND FOR PRICE LIST.

STEEL RAILS, T AND STREET.

OPEN HEARTH AND BESSEMER STEEL
BLOOMS, SLABS AND BILLETS,
Rolled and Hammered.

HOMOGENEOUS STEEL BLOOMS,
FOR BOILER PLATE.

BLOOMS AND BILLETS,
For Nails, Wire, and Bridge Bars.

MACHINERY STEEL,
Rounds, Squares and Flats.

SPRING STEEL,
Flat or Concave.

Pennsylvania Steel Company.

ADDRESS:

S. M. FELTON, President, 208 South 4th Street, Philadelphia, Pa.
L. S. BENT, Vice-Pres. and Gen'l Mngr, Steelton, Dauphin Co., Pa.
FREDERICK W. WOOD, Superintendent, Steelton, Dauphin Co., Pa.
STEPHEN W. BALDWIN, Agent, 160 Broadway, New York.

STEEL FORGINGS, Heavy and Light.

STEEL CAR AND MINE CAR AXLES.

RAIL FASTENINGS, SPIKES, &c.

INTERLOCKING

SWITCHES AND SIGNALS,

CROSSINGS, FROGS, SWITCHES,
SWITCH STANDS,

OF ANY REQUIRED PATTERNS.

STEEL SHAFTING,
Hammered and Rolled.

CORRESPONDENCE SOLICITED.

Norwich Bolt Works, William C. Lanman,

NORWICH, CONN.

Carriage Bolts, Whiffletree, and Fancy Head Bolts, Hand-Forged from Genuine Norway Iron. None in Market finer in quality or in finish. Prices as low as for Interior Work.

WARNER'S

Wood Worker's Clamps



FOR
Carriage, Cabinet and
Machinists' Use.

MANUFACTURED BY

The G. F. Warner Mfg. Co.,

Malleable and Grey Iron Founders,

212 to 228 EAST STREET
NEW HAVEN, CONN.

A. FIELD & SONS,
MANUFACTURERS OF

WIRE NAILS

of Every Quality and Description.
Taunton, Mass., & 78 Chambers
Street, New York,

C. M. HOPKINS.

C. M. MILLER.

S. A. HAINES & CO.,

Iron Nails and Hardware,

88 Chambers Street, New York,

REPRESENTING DIRECT:

Lindsay & McCutcheon.....Hoop, Band, Wagon Box and Horse Shoe Iron.
Long & Co.....Merchant Bar Iron, Axe Iron, &c.
Hartman Steel Co.....Open-Hearth and Bessemer Steel and Wire Nails.
Bellefonte Iron and Nail Co.....Cut Nails and Spikes.
La Belle Iron Works.....Steel Cut Nails and Spikes.
Hubbard, Bakewell & Co.....Axes, Saws, Shovels, Spades, Hoes, &c.
Buffalo Hammer Co.....Forged Steel Hammers.
W. A. Ives & Co.....Augers, Auger Bits and Braces.
L. M. Dayton.....Carriage, Machine, Tire and Plow Bolts.
J. Barton Smith Co.....Files, Raps and Wood Saws.
Geneva Tool Co.....Hay and Manure Forks, Garden Hoes and Rakes, &c.
Norfolk Shear Co.....Cast Steel Shears and Scissors.
McKay & Hammond.....Coil and Crane Chain.
E. Jenckes Mfg. Co.....Bright Wire Goods, Spring Pins and Keys and Belt Hooks.
Starr Bros. Bell Co.....Gongs, Hand and Sleigh Bells.
Pittsfield Tack Co.....Tacks, Brads, Shoe Nails, &c.
The Machine and Steel Pulley Co....."Perfection" Roller Skates.
H. Chapin's Son.....Rules, Plumbs and Levels, Gauges, &c.
Logan & Strobbridge.....Coffee Mills, Cast Goods, &c.
Dille & McGuire Mfg. Co.....Richmond Star Lawn Mower.
M. J. Mumper & Co.....Trace, Wagon, Breast and Log Chains, &c.
Pratt & Letchworth.....Iron and Wood Hames, Bridle Bits, &c.

Our friends will do themselves a favor by corresponding with us for
Prices before placing their orders.

WE SHIP ALL GOODS FROM THE FACTORY AND AT FACTORY PRICES.

Note the changes that occur in this space weekly.

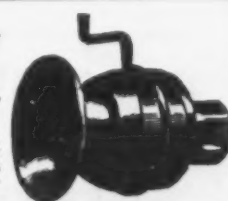


W. R. OSTRANDER & CO.,

21 & 23 ANN STREET, NEW YORK,

Manufacturers of
SPEAKING TUBES, WHISTLES, ELBOWS, ORAL ANNUN-
CIATORS, BELL & ELECTRIC WIRE TUBING.

Complete outfits of Speaking Tubes, Whistles,
Pneumatic Bells, &c. A full line of Speaking
Tube Hardware constantly on hand. Catalogues
on application. Factory, DeKalb Ave., near Knick-
erbocker, Brooklyn, L. I.



RHODE ISLAND HORSE SHOE CO.,

MANUFACTURERS OF

Horse, Mule & Snow Shoes OF THE Perkins Pattern.

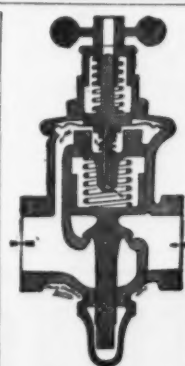
Works at Valley Falls, R. I.

Office, 31 Exchange Place, Providence, R. I.

F. W. CARPENTER, President.

C. H. PERKINS, Gen'l Manager.

R. W. COMSTOCK, Secretary.



CURTIS Pressure Regulator,

FOR
STEAM AND WATER,
is made entirely of metal
occupies the same space as
a globe valve. It has no
stands or packing, and is a
lock-up valve. Write for
circular. Manufactured by

Curtis Regulator Co.,
51 Beaver St., Boston, Mass.
General Agencies: 100 Lib-
erty St., N. Y.; 19 No. 7th St.,
Philadelphia; 95 & 98 Market
St., Chicago; 49 Holliday St.,
Baltimore; 21 5th St., Pitts-
burgh; 745 Craig St., Mont-
real; 707 Market St., St.
Louis.



THE "AUTOMATIC"
BLIND AWNING FIXTURE
FOR OLD OR
NEW BLINDS
MAKING BLINDS
OR
AWNINGS
AT WILL
F. O. NORTH & CO.
SOLE MANUFACTURERS
BOSTON

COLD ROLLED
STEEL AND IRON
Figures, Letters, Stamps
and Type.

SEND FOR CIRCULAR.

Bellows & Dickey,
833-839 Sheriff St.,
CLEVELAND, OHIO.

COBB & DREW,

PLYMOUTH, MASS.,

Manufacturers of Copper, Brass and Iron Rivets;
Common and Swedes Iron Leathered, Carpet, Lace
and Gimp Tacks; Finishing, Hungarian, Trunk,
Clout and Cigar Box Nails, &c. Rivets made to
order.

NEW YORK AGENCY,
GRUNDY & DISOSWAY,
HARDWARE,
165 GREENWICH STREET.

Agents for the Philadelphia Star Carriage and Tire Bolts.



John McLean,
Manufacturer of
Ayers' Hydrants,
Stop Cocks & Galvan-
ized Cemetery Supplies,
26 & 28 Monroe St., N. Y.

THE BABCOCK & WILCOX CO.,

WATER TUBE STEAM BOILERS,

107 Hope Street,
GLASGOW.

30 Cortlandt Street,
NEW YORK.

BRANCH OFFICES

BOSTON, 50 Oliver Street.
PHILADELPHIA, 32 N. 5th Street.
LONDON, 114 Newgate St.
CHICAGO, 64 S. Canal Street.

NEW ORLEANS, 54 Carondelet St.
SAN FRANCISCO, 501 Mission St.
HAVANA, 50 San Ignacio.

Send to Nearest Office for Circular.



ESTABLISHED 1855

A. WICKOFF & SON

PATENT



WOOD-WATER-PIPE

CHAIN-PUMP-TUBING

101 to 111 EAST-CHEMUNG-PLACE

EUMIRA-NY

N. Y. MALLET AND HANDLE WORKS

Manufacturers of

CALKERS', CARPENTERS', STONE CUTTERS', TIN, COPPER AND BOILER MAKERS'

MALLETS,

Hawking Beetles, Hawsing and Calking Irons; also all kinds of Handles, Sledge, Chisel and Hammer Handles. Also

Cotton & Bale Hooks,

Patented Feb. 13, 1877, a new combination of Hooks.

456 E. HOUSTON ST., New York City.

E. PHILLIPS & SONS,

MANUFACTURERS.

South Hanover, Mass.

Wire Nails

F. R. EMMONS & BRO.

158 CHAMBERS STREET, New York.

P. W. Gallaudet & Co.,

Cor. Broadway and Wall St., New York. Bankers and dealers in COMMERCIAL PAPER. Stocks and Bonds dealt in for cash or on margin at New York Stock Exchange.

WHIPPLE MFG. CO.

MANUFACTURERS

Door Locks, Knobs,

BRONZE GOODS AND BUILDERS' HARDWARE.

Soft Small Gray Iron Castings a Specialty.

CLEVELAND, OHIO, U. S. A

The Bolton Steel Co.

CANTON, OHIO,

MANUFACTURERS OF BEST REFINED

Tool Steel

And Other Fine Grades of

CAST STEEL

The Scientific Portable Forge.

Hand Blowers,

Entirely new in principle.

No Ratchets, Pawls or Friction Devices.

15 styles and sizes for all kinds of work. Fully guaranteed.

Manufactured by

The FOOS MFG. CO

SPRINGFIELD, OHIO.

Fairbanks & Co., AGTS.

311 Broadway, N. Y.

215 Main St., Buffalo, N. Y. 715 Chestnut St., Phila. Pa. 17 Light St., Baltimore, Md. 44 Wood St. Pittsburgh, Pa. 262 Broadway, Albany, N. Y. 13 Camp St. New Orleans, La.

PHOSPHOR TIN.

By using my Phosphor Tin, manufacturers can make any desired grade of Phosphor Bronze themselves, by the simple process of melting, much cheaper than they are now to be had in the market. New or old copper can be used. For circulars and prices address

FRED. NAUMANN,

Sole Agent for the United States and Canada, New York, 479 and 481 Broome Street.

KEYSTONE SCREW CO.,

17th and VENANGO STS., PHILA.

J. BILLERBECK,

Manufacturer of IRON AND BRASS

Gimlet-Pointed Wood Screws.

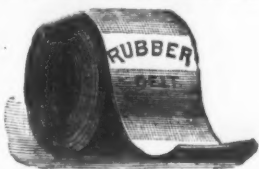
WRITE FOR DISCOUNTS.

Vulcanized Rubber Fabrics

ADAPTED TO Mechanical Purposes.

RUBBER BELTING AND PACKING.

Machine Belting, Steam Packing, Leading Hose, Suction Hose, Grain Elevators, Steam Hose, Piston Rod Packing, Gaskets and Rings,



Vacuum Pump Valves, Ball Valves, Car Springs, Wagon Springs, Gas Tubing, Machine Belting, Billiard Cushions, Emery Wheels.

This company manufactured the immense DRIVING and ELEVATOR BELTS for the Buckingham Elevators at Chicago, which have been running perfectly for more than twelve years; also those for Armour, Dole & Co. of Chicago; Vanderbilt's Elevators for the N. Y. Central & Hudson River R. R.; the great Elevators for the Penna. and Erie Railroads, of Jersey City and Hoboken; Dow's Stores, of Brooklyn, and many others—in fact, the largest Belts for the large Elevators in the world. A single carrier belt in the Penna. R. R. Elevator is over 200 feet long, weighing 18,000 pounds, and has run perfectly from the start.

LINEN AND COTTON HOSE.

Plain and Rubber Lined.

Circular Woven Seamless Antiseptic RUBBER LINED "CAELE" HOSE and "TEST" HOSE, Vulcanized Para Rubber and Carbolized Duck, for the use of Steam and Hand Fire Engines, Force Pumps, Mills, Factories, Steamers, Ships, Hospitals, &c.

"Test" Hose.

"Cable" Anti-septic.

EMERY WHEELS AND PACKING.

PATENTED.

ORIGINAL

SOLID VULCANITE EMERY WHEELS.

Emery Wheel.

LARGE WHEELS MADE ON CAST-IRON CENTER IF DESIRED.

The properties of these Wheels are such that they can be used with great advantage and economy for cutting, grinding and finishing Wrought and Cast Iron, Chilled Iron, Hardened Steel, Slate, Marble, Glass, &c. These Wheels are extensively used by manufacturers of Hardware, Cutlery, Edge Tools, Plow, Saws, Stoves, Fire Arms, Wagon Springs, Axles, Skates, Agricultural Implements and small Machinery of almost every description.

Pat. Jan. 26, 1869.

PATENT ELASTIC Rubber Back Square Packing

BEST IN THE WORLD

For Packing the Piston Rods and Valve Stems of Steam Engines and Pumps.

B represents that part of the packing which, when in use, is in contact with the piston rod. A the elastic back, which keeps the part B against the rod with sufficient pressure to be steam-tight, and yet creates but little friction.

This Packing is made in lengths of about 20 feet, and of all sizes from 1/4 to 2 inches square.

Corrugated Rubber Mats and Matting,

Pat. 11,208, 213,601.

For Halls, Flooring, Stone and Iron Stairways, &c.

Pat. July, 1879.

NEW YORK BELTING & PACKING CO.,

Warehouse, 15 Park Row (opposite Astor House), New York.

Branches: No. 308 Chestnut Street, Philadelphia; 167 and 169 Lake Street, Chicago; 52 and 54 Summer Street, Boston.

JOHN H. CHEEVER, Treas. JOHN D. CHEEVER, Dep. Treas.

BUCK BROTHERS, MILLBURY, MASS.

The Most Complete Assortment in the U. S. of

Shank, Socket Firmer and Socket Framing Chisels

PLANE IRONS.

CAUTION.—Buyers should be on their guard and not have inferior goods palmed on them by unprincipled persons who represent them as our make. Our tools are stamped "BUCK BROTHERS," and our labels have on our trade-mark also, "Riverlin Works."

PHOSPHOR-BRONZE

FOR

Bearings, Slide Valves, Cylinder Rings, Cross-Head Gibs, Steps, Bushings,

And all purposes where Maximum Durability, Anti-Frictional and Non-Cutting Qualities are Desirable.

PUMP RODS, BOLTS and NUTS, MACHINE and WOOD SCREWS, &c., &c.

Combine Toughness, Strength, Durability and Resistance to Corrosion.

THE PHOSPHOR-BRONZE SMELTING CO., LTD.,

No. 512 Arch Street, PHILADELPHIA, PA.

Owners of the U. S. Phosphor-Bronze Patents. Sole Manufacturers of Phosphor-Bronze in the U. S.

By using my Phosphor Tin, manufacturers can make any desired grade of Phosphor Bronze themselves, by the simple process of melting, much cheaper than they are now to be had in the market. New or old copper can be used. For circulars and prices address

FRED. NAUMANN,

Sole Agent for the United States and Canada, New York, 479 and 481 Broome Street.

KEYSTONE SCREW CO.,

17th and VENANGO STS., PHILA.

J. BILLERBECK,

Manufacturer of IRON AND BRASS

Gimlet-Pointed Wood Screws.

WRITE FOR DISCOUNTS.

PHOSPHOR-BRONZE

FOR

Bearings, Slide Valves, Cylinder Rings, Cross-Head Gibs, Steps, Bushings,

And all purposes where Maximum Durability, Anti-Frictional and Non-Cutting Qualities are Desirable.

PUMP RODS, BOLTS and NUTS, MACHINE and WOOD SCREWS, &c., &c.

Combine Toughness, Strength, Durability and Resistance to Corrosion.

THE PHOSPHOR-BRONZE SMELTING CO., LTD.,

No. 512 Arch Street, PHILADELPHIA, PA.

Owners of the U. S. Phosphor-Bronze Patents. Sole Manufacturers of Phosphor-Bronze in the U. S.

Merrill Brothers,

26 First Street, BROOKLYN, N. Y.

DROP

HAMMERS, FORGINGS and POWER PRESSES.

SCIENTIFIC AND TECHNICAL.

Cork as a Non-Conductor of Heat.

Some years since the firm of Gruenzweig & Hartmann, of Ludwigshafen-on-the-Rhine, introduced cork as a non-conductor of heat. It consists of cork findings ground and treated with a binding material. The mixture is shaped into semi-cylindrical forms for covering steam-pipes. They are wrapped around the latter and are tied with iron, and, after the moisture is expelled, the joints are fitted with asbestos paste. This is covered and is finally given a coating of pipe-clay. This non-conducting covering, when the cork is 3/4 inch thick, weighs only 0.82 pound per square foot, the specific gravity of the cork preparation being 0.19. Cork board and cork brick are also used, the former having been introduced into the German navy.

Experiments in Firing Submarine Mines in England.

The London Times gives particulars of some important experiments carried out on the torpedo ground outside Portsmouth Harbor, in the Solent. Within the area of the torpedo field situated opposite the sea fronts of Forts Monckton and Gilkicker, near Portsmouth, an important experiment in submarine mining was carried out by Captain Markham and Commander Robinson, of the Vernon, on the part of the Royal Navy, and by Major Bucknill and Captain Wrottesley on the part of the royal engineers. At each corner of a quadrilateral was sunk a heavy mine consisting of 500 pounds of gun-cotton inclosed in wrought-iron cylinders, all four being in separate electrical connection with a battery on shore. The distances of the mines apart were the same as is usually observed in the navy as being within effective destructive range. At various known distances from the charged mines were submerged a great number of cases of various construction loaded down with dummy gun-cotton as target mines, and the object of the experiment was to ascertain the effect upon the different structures of exploding heavily charged submarine mines in their neighborhood. Twelve of the targets consisted of simple royal engineer mines, lined with plaster-of-paris and cement, also of electro-contact mines. The targets also included naval countermines, fixed mines and electro-contact mines, service and experimental. Among others were samples of the ingenious mechanical fixed torpedo invented by Lieutenant Ottley, late of the Vernon, which sinks to a predetermined depth on being thrown overboard, and a solitary example of the mines which were manufactured in England for the use of the Chinese Government on the commencement of hostilities with France. This differs from the service pattern in form and material, being constructed of cast iron instead of wrought iron, and semicircular or umbrella-shaped in section instead of cylindrical or spherical. The various mines were all fixed buoyantly, and were destitute of blowing-up charges, as the purpose in view was not to discover whether the explosion of the heavy mines would detonate those in their midst, but to learn the comparative effects of the concussion on the containing vessels and gear, the force of the explosives at different ranges being measured by crusher gauges. Such heavy charges of gun-cotton, amounting in the aggregate to 2000 pounds, and having an energy equal to about 8000 pounds of gun-powder, had not previously been simultaneously discharged at Portsmouth. The charges were simultaneously exploded at 12.15 on a half-ebb tide. As a spectacle the effect was somewhat disappointing. The spouts of water were almost connected and were extremely jagged in outline, but they did not rise to the height expected, the stream of mud which overflowed the interior lining of the jets showing that the mines were scarcely buoyant at the time of the explosion. The detonation was not unpleasant on shore, but the radial extension of the disturbance must have been effective, as fish were stunned at considerable distances out to sea. The results of the experiment cannot yet be known, but it is believed that the Chinese mine is broken up.

The Daft Electric Motor in Baltimore.

Mr. Robert L. Harris has lately given an account at a meeting of the American Society of Civil Engineers on the working at Baltimore of the Daft electric motor, now being tested on the Ninth-avenue line of the New York Elevated Railroad.

The Baltimore and Hampden Railroad is a suburban line of about 2 miles in length; gauge, 5 feet 4 1/2 inches. It was heretofore an old horse railroad, and is a feeder to a main line of the Baltimore horse railroads. It is now operated by the Daft motors. This road has iron rails, 25 pounds per yard, laid on cross-ties in a cheap manner, and runs along the side of suburban streets or roads. The country is undulating and the route is crooked. Its curves are from 40 feet to 90 feet radius, and the grades are from level to the rate of 330 feet per mile. The superintendent, Mr. T. C. Robbins, says there are only about 300 feet of continuous level on the route, and very little level on its entire distance. A 25-pound steel rail has been placed on insulators near the middle of the ties as conductor, and was roughly guarded by joists and planks laid on each side of it. The reason for using 25-pound rails as conductors was simply that in case of failure they would be useful for repairs. It was unnecessarily large for a conductor. Electricity has been used upon the road in place of horses since September 1, 1885. The sections of conducting-rail, as also of the track-rails, are electrically connected by wires. In some places these wires are not insulated, and the rails were connected by a mere loop of 1/2-inch copper wire. The connections at main dynamo are of 3/4-inch copper wire insulated. At the cheap engine-house there is a boiler, two doors to the fire box, 14 feet long, 5 feet diameter, with 60 3/4-inch flues. The engine is 16 x 24 inch cylinder, which, with 30 pounds of steam at 110 revolutions per minute, is said to develop about 75 horse-power. This engine drives two nominal 50-horse-power Daft dynamos, which supply the electric current to the rail. The engineer said that when both motors, each with a loaded car attached, were ascending the steepest

hills the full capacity of his engine was used, but when neither were on a hill not 10 horse-power was used. This engine uses about 1 1/2 tons of coal per day of 18 hours, with fires banked at night. Two motors are in use, each weighing about 4500 pounds and rated at 10 horse-power. A new motor, weighing about 5000 pounds and rated at 20 horse-power, has just arrived, and was connected with the current and moved about. The fast motion of the armatures, stated as about 1200 revolutions per minute, was geared to the driving-axle of the motor by ordinary tooth-gearing wheels in the proportion of 12 to 1, and the speed of the motor arranged for 12 miles an hour. But one strength of current has thus far been used, of low intensity; there has been no occasion for other powers of current. No electric brake is being used.

We rode on a regular trip to the end of the road and back with a street car attached, such as is ordinarily used with two horses. The average load was about 18 passengers. We went around one curve of 40 feet radius on a grade of 275 feet per mile, and around a curve of 70 feet radius on a grade of 330 feet per mile. While we were ascending a grade of about 320 feet per mile, the other motor was said to be at the same time ascending a similar grade. We stopped near the middle of this grade, and started from full stop without difficulty. The toothed gearing made some noise, but passing horses did not seem frightened. It is expected to avoid toothed gearing by friction gear. The motors are controlled by one man, and, with car attached, start from each terminus about once an hour, and pass each other by side track. Mr. Robbins told me that the Morse has run 1006 miles with no repairs (except oiling). Its average duty is 75 miles per day. No especial skill is needed; he had at times run his motors with men taken right off the road. He is satisfied with this power, and hopes that his company will soon use it on the other 6 miles of suburban road which they own. His company own also 14 miles of Baltimore City horse railroads. He considers that his present power would run on his road five motors, each carrying one car, and, were there but 150-foot grades on his road, his present power would run five motors with three cars each. As now run the two motors take the place of 30 horses and are as cheap, and were he running eight cars there would be a saving of one-half the cost of horses for the same duty. There has been no trouble in heavy rain and thunder storms; he thinks it works better in wet weather, and has even known the flange of the conducting-rail to be in water for a short distance during a rain storm. He says two of the men that have run the motors were locomotive engineers, and their expression was, "It lays away over steam." In fact, he thinks steam would not, with such light engines, carry such loads up such grades as has been done by the motors. Mr. Robbins states that he had had no troubles other than mechanical, which are now remedied (the armatures and brushes were at first too light).

As a test for himself, Mr. Robbins once sent to the city for one of their heaviest cars. . . . 5,100 pounds. And carried a load of 81 persons over the road (say, 81 x 125 pounds) . . . 10,125 pounds. The weight of the motor used was . . . 4,500 pounds.

Total . . . 19,725 pounds. Thus he says that 19,725 pounds were carried over the road by one motor of . . . 4,500 pounds. His engine and boiler cost, approximately . . . \$2,400. His two motors cost, approximately, \$300 each . . . 6,000. Total . . . \$8,400.

There is also the expense of conducting rails and wires, insulation, protection, &c.

His expense of running per day is 1 1/2 tons of soft coal . . . \$4.75. Engineer and fireman at power station . . . 4.50.

Or, excepting, oil, waste, wear and tear . . . \$9.25 per day.

The above represents the cost of his power, and equals the work of 30 horses per day. The average receipts from the cars carried by the two motors are \$18 per day, and he has taken (on a Sunday) total receipts of \$86 in one day.

A Danger in the Distribution of Electricity.

Dr. J. Hopkinson has pointed out that in the distribution of electricity by secondary generators, by means of an alternating current led through the primary wires of a series of induction coils, there is an unnoticed element of danger to the users. Theoretically speaking, every induction coil is a condenser, and the primary coil acts electrostatically as well as electro-magnetically upon the secondary coil. This electrostatic action may easily become dangerous if the secondary generator is so constructed that its electrostatic capacity, regarded as a condenser, is other than a small quantity. Secondary generators of large electrostatic capacity are, upon Dr. Hopkinson's showing, essentially dangerous, owing to chances contact between the user and the two terminals of the secondary coil, even though the insulation of the primary circuit and the primary coils from the secondary coils is perfect. The conclusion is that constructors of such apparatus should take care that the secondary generators should not have a large electrostatic capacity, say not more than 1/10 microfarad, or, better still, less than 1/100 microfarad. The system should be tested for safety. This can be done by placing a secondary generator of greatest capacity at one end of the line and connecting its secondary circuit to earth through any instrument capable of measuring alternating currents under 1 ampere. The other end of the primary should be put to earth. The reading of the meter should not exceed such a current as it may be demonstrated that a man can endure with safety.

The Manufacture of Hydrogen.

The communication which MM. Felix-Humbert and Henry have just made to the French Academy of Sciences has roused much anxious attention, not only in France but all over Europe. If the process which these gentlemen have described marks a new departure in gas-making, the matter is of weighty import, not only to the gas manufacturers, but also to the coal owners

NEW AND IMPROVED BUFFALO CUPOLA & FORGE BLOWERS



All Sizes
and Styles,
for Every
Possible Duty

The Most
Positive,
Durable and
Economical
Made, and

GUARANTEED TO GIVE
PERFECT SATISFACTION

BUFFALO FORGE COMPANY,
BUFFALO, N. Y.

PENFIELD BLOCK COMPANY
LOCKPORT, NEW YORK.
MANUFACTURERS.

AGENCIES WITH
H.B. NEWHALL CO.
NEW YORK &
BOSTON.

ALL SIZES AND KINDS WITH CAST OR WROUGHT WHEELS.
WOOD AND WROUGHT IRON BLOCKS FOR RAILROAD AND MINING WORK A SPECIALTY. LARGEST AMERICAN MANUFACTURERS OF WROUGHT BLOCKS. CATALOGUES FURNISHED AND SAMPLE ORDERS SOLICITED.

A LEAD PIPE CUTTER
Is just what Plumbers and Tinsmiths have been looking for but never found, until this convenient and almost indispensable tool was invented. It cuts the pipe without either chips or burrs and much quicker than is possible in any other way.
A person once using one would never do without it. For circulars and information, ADDRESS,
R. T. SOLLIS & CO., Brockton, Mass.

**BEST ROOF
METAL SHINGLES**
In the World is the Montross Patent
Cheap, Durable, Handsome, Fireproof.
Absolutely Water-tight.
Proof against Storms, Snow and Ice.
Can be put on by anybody.
Adapted for all classes of Buildings.
Send for Circulars and Price Lists, free.
E. VAN NOORDEN & CO., BOSTON, MASS.

PRIZE MEDALLISTS.
Exhibitions of 1862, 1865, 1872, 1873, and only Award and Medal for Noiseless Steel Shutters at Philadelphia 1876, Paris, 1878, and Melbourne, 1881.
CLARK, BUNNETT & CO., LIMITED,
LATE CLARK & COMPANY,
Original Inventors and Sole Patentees of
NOISELESS, SELF-COILING, REVOLVING STEEL SHUTTERS,
Fire and Burglar Proof. Also Improved Rolling Wood Shutters of various kinds, and Patent Metallic Venetian Blinds.
Office and Manufactory, 162, & 164 West 27th St., New York.

AMERICAN TOOL COMPANY,
116 CHAMBERS STREET, NEW YORK.
MANUFACTURERS OF

TOOL CHESTS.
In a Great Variety of Sizes and Styles, for the use of Boys, Youths, Gentlemen, Housekeepers, Farmers, Planters, Carpenters, Railroads and Mines, fitted up complete with a superior quality of tools.
Also Machinists' Empty Tool Chests.
Our illustrated Catalogue for Fall Season of 1886 is now ready and will be furnished on application, with prices. Every dealer in Hardware and House Furnishing Goods, Machinists' and Railway Supplies should keep a stock of these goods on hand at all times to supply the constant and increasing demand. We are the only company in the United States who make a business of manufacturing Tool Chests exclusively.

THE HOPSON & CHAPIN MFG. CO.,
PEQUOT FOUNDRY & MACHINE WORKS,
New London, Conn.
Fine Iron Foundry and Machine Work.

Acquaintance With New Work is Solicited.
The plant of our works embraces complete equipment for Iron Foundry, Machine Shop, Polishing, Bronze, Japanning, Coppering, Lacquering, Brass Electro-Plating on Iron, and Pattern Designing and Building in Wood Soft Metal, Brass and Iron.

THE MENEELY HARDWARE CO.,
WEST TROY, N. Y.,
Manufacture Safety and Guard Harness Snaps
Snap-Links for chain adjusting and repairing.
Rope Goods for horses and cattle. Breast Chains
with sleeve snaps, &c., &c.
Price List and Descriptive Catalogue sent free.

THE BOSS UPSET.
Mather's Patent Saw Swage.
SUPERIOR TO ALL OTHERS.
If your Hardware Merchant does not keep it, send \$2.50 to the manufacturer, who will forward it by mail. Liberal discount to the Trade. Send for circular.
JOHN MATHER, Leominster, Mass.

THE IMPROVED "EASY" LAWN MOWER.

The only practical
Forward-Cut
Roller Mower
ever on the market, combining Durability with extreme Light Weight.
Blair Mfg. Co.
Springfield, Mass.



LATHE & MORSE TOOL CO.,
Manufacturers of
Engine Lathes, Planers, Chucking Lathes, Hand Lathes,
and Machinists' Tools Generally.
Worcester, Mass., U. S. A.



Established 1845.

Send for Catalogue.

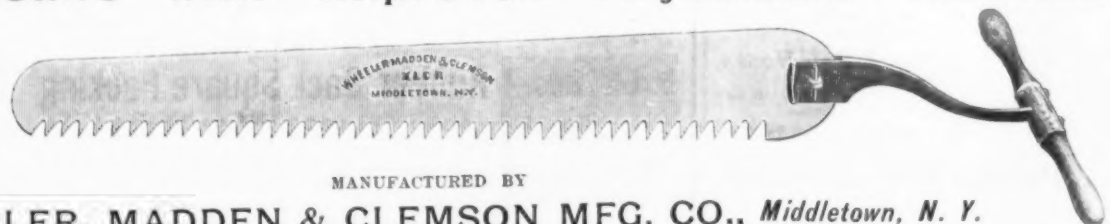
"Empire" Bronzed Horse Nails.

The Livingston Horse Nail Co.,

104 Reade Street, New York,

Sole Agents.

Ice Saws with Improved Adjustable Handles.



MANUFACTURED BY
WHEELER, MADDEN & CLEMSON MFG. CO., Middletown, N. Y.

These Saws are best quality, well finished and handsomely etched. Handles are easily removed and adjustable to different positions. We have large stock ahead, and can fill orders promptly.

VIRGINIA NAIL AND IRON WORKS COMPANY, LYNCHBURGH VIRGINIA.

NAILS and Bar Iron of Superior Finish, made exclusively from Pig Iron.

Patented Articles
OF
MALLEABLE IRON.
New Improved
Malleable Iron
PATENT
OILERS.
Three Sizes, Nos. 1, 2 and 3.

Hammer's
Adjustable Clamps.
Mail, Iron Hand Lamps.
M. I. Hanging Lamps.
New Pattern Heavy Screw Clamps.
Strongest in the market.

For Sale by all the Principal Hardware Dealers.
SEND FOR PRICE LIST.
MALLEABLE IRON CASTINGS
of superior quality, and Hardware Specialties
in Malleable Iron, made to order.

HAMMER & CO., Branford, Conn.

WM. MANN, JR., & CO.,
LEWISTOWN, PA.
Manufacturers of
**RED WARRIOR
AXES,
BROAD AXES,**
Adzes,
Broad Hatchets,
Spanish Axes
and Tools.
Branch Office,
97 Chambers St., N. Y.
E. A. BOLMES Mgr.

PATENTS.

Send sketch or model for FREE opinion as to patentability and 70-page book on Patents: 15 years' experience: four years examiner in U. S. Patent Office. Mention this paper.
E. B. STOCKING, Atty., Washington, D. C.
The T. H. Bullock
BELLOWS FORGES
Cleveland, Ohio.

PERRINE PATENT
Curved Blade **HOE** Double Shank
Manufactured only by the
CANTON HOE & TOOL CO.,
CANTON, OHIO, U. S. A.

HUSSEY, BINNS & CO., (LIMITED), PITTSBURGH,

MANUFACTURERS OF
**COMMON SENSE
Post Hole Diggers**
and a complete line of
Shovels and Spades.

PRICES QUOTED ON APPLICATION.

GALLOWAY BOILER

IMPROVED UNDER PATENTS OF 1875 AND 1876.

Safety, Economy in Fuel, Low Cost of Maintenance, Dry Steam without Superheating, Large Reserve Power,

ARE THE ADVANTAGES OFFERED BY THIS BOILER IN A PRE-EMINENT DEGREE.

3000 Horse-Power in Progress and for Immediate Delivery. Correspondence Solicited.

EDGE MOOR IRON COMPANY,

SOLE LICENSEE AND MANUFACTURER FOR THE UNITED STATES,

POST OFFICE, WILMINGTON, DELAWARE.

Philadelphia Office, 1600 HAMILTON STREET. - - - New York Office, 79 LIBERTY STREET.

WM. SELLERS, Pres. JNO. SELLERS, JR., Vice-Pres. ELI GARRETT, Sec. and Treas. GEO. H. SELLERS, Gen. Supt.

BELLAIRE STEEL NAILS

MANUFACTURED BY THE

BELLAIRE NAIL WORKS,

ALSO

STEEL SLABS FOR NAILS.

OFFICE AND WORKS,

BELLAIRE, OHIO.

DURRIE & McCARTY, 97 Chambers St., New York, Sole Eastern Sales Agents.

MANUFACTURERS OF AND DEALERS IN ALL KINDS OF

FOUNDRY-FACINGS

PLUMBAGO OR BLACK LEAD

For All Purposes.

ALSO SHIPPERS OF THE CELEBRATED

CINCINNATI MOLDING SANDS

For Stove Plate, Heavy and Light Machinery, Agricultural and Brass Work.

Agents for MONK'S CELEBRATED MOLDERS' TOOLS.

Send for Illustrated Catalogue and Price List. No charge for Samples.



EAGLE

THE LARGEST FACING MILLS IN THE WORLD. Capacity, 650 Barrels Per Day.

FOUNDRY-SUPPLIES

MILLS

HEAVY MACHINERY

AND FINE

STOVE PLATE FACINGS

A Specialty.

S. OBERMAYER FOUNDRY SUPPLY MFG. CO.,
CINCINNATI, - - OHIO.

Mount Carmel Ox Shoes,

WITH STEEL TOE CALKS.

The Best and Cheapest Shoes Made.

WARRANTED

TO OUTWEAR ANY OTHER SHOE.

Miller's Pat. Forged Ox Shoes.

CORRESPONDENCE SOLICITED.

WOODRUFF, MILLER & CO., Mfrs., Mount Carmel, Conn., U. S. A.

BUCKEYE JUNIOR LAWN MOWER.

Made in Four Sizes: 10, 12, 14 and 16 inch cut. Most reliable Mower in use. Easy to work, strong and durable.

Also manufacturers of the Buckeye Hose Reel and Lawn Sprinkler, Iron Turbine Wind Engines, Buckeye Force Pumps and Buckeye Iron Fencing. Send for Illustrated Circulars to MAST, FOOS & CO., Springfield, O.

Samuel Martin,
MANUFACTURER OF
Theatrical Hardware,
127 Eighth Avenue, NEW YORK



Bright Metal Cages, in Brass, Bronze and Silver Plate.

NEW AND BEAUTIFUL DESIGNS JUST OUT.

We also Manufacture Brass and Bronze Show Stands for Fancy Goods. Catalogues Mailed Free.



The Original Inventors and Manufacturers of the

"OSBORN"

and ironmasters. It will affect in no considerable degree the consumption of coal and modify some of the processes of iron manufacture. The communication to the Academy describes an improved method of making water gas, of producing pure hydrogen at an extremely low cost. A jet of superheated steam is directed into a retort filled with incandescent coke. The oxygen unites with the carbon to form carbonic oxide, and hydrogen is liberated. Up to this point there is nothing new in the process. But now these gases are led away to a second retort filled with lumps of some refractory substance maintained at a red heat. The use of the refractory materials is to expose a large surface to the incoming gases. Into this second retort there is led at the same time a jet of steam superheated to the point of dissociation. The oxygen of this steam seizes upon the carbonic oxide to form dioxide, and more hydrogen is liberated. To remove the carbon dioxide the gases are passed through milk of lime, and the pure hydrogen is led away to the reservoir. The authors of the communication say that 1 ton of coke produces about 65,000 feet of gas, which is about 11 times the quantity obtained from a ton of coal. Not the least astonishing part of the process is the cost of the gas, which is said to be very low. It is easy to see the numerous applications of such a gas for heating purposes; but the inventors have arranged to make a start with it for lighting. How the carbonization is to be effected is not stated, but it is announced that the little town of Boulogne-sur-Seine is to be lighted with this gas during the winter.

The Germans in the Rail Trade.

Iron, in a recent issue, takes the following view of the policy of the English rail-makers entering into a pool with the German manufacturers of steel rails:

It has long been a puzzle to reconcile how the German manufacturer manages to sell at such low prices abroad and such high ones at home. One naturally exclaims either the profit in the latter case must be enormous or the loss in the former equally great. That the former is by no means the case is evidenced by the great complaints prevalent in the iron trade in Germany, and also by the fact that the published balance sheets of many of the public companies, in the majority of cases, show either moderate profits or else losses. As these balance sheets do not, however, show the separate results of the home and of the foreign trade done by these firms, but only the general result, we do not arrive much further thereby on the road to a solution of the question. It is possible, however, to approximate the effects of the system by some simple calculation of the Rule of Three character. Two of the figures or quantities employed are known to us—firstly, the selling price in Germany to German consumers; secondly, the selling price at German seaports to foreign consumers. From these we have to calculate the unknown quantity—i. e., the profit or loss. The price of steel rails affords a good example to work upon. We may take the average value of these during 1885 on trucks at makers' works for sale to German customers at £7 per ton. The average price during the same time, delivered f.o.b. Hamburg, for export, has been £4. 15/ per ton. We assume in the first instance that a works with a production of 1000 tons per week, on which, at £7 per ton, it has hitherto made the handsome net profit of 10/ per ton, or £26,000 per year, determines to increase its output to 2000 tons per week, with the double view of reducing the pro rata cost per ton turned out and of securing a foreign connection. We will assume, although it is hardly likely, that the saving of incidental and other expenses on the increased turnover thereby comes to 10/ per ton. There will thus be a profit of 20/ per ton on home sales on a cost price of £6 per ton and selling price of £7 per ton, equal to a profit in this department of £52,000 per annum. On the other hand the remaining 1000 tons per week, sold f.o.b. Hamburg at £4. 15/ per ton, would give a minus difference of 25/ per ton, to which add the moderate sum of 5/ per ton to cover railway freight to Hamburg and shipping expenses there, making a total loss per ton of 30/, or a total yearly loss in this department of £75,000, which considerably more than swamps the total profit of the works for one year.

Supposing, however, that two-thirds of the output were sold at home and only one-third abroad, we should arrive at a gain on the first department of not quite £70,000, and a loss on the foreign department of £52,000, or a total net gain of £18,000 as compared with £26,000 made the previous year, when their sales were confined to Germany, with this additional disadvantage that the wear and tear of both the personnel and the plant of the establishment and the risk of bad debts and other losses would have been doubled, and, moreover, the profit would have to be spread over the larger capital necessitated by the enlargement of the works in order to double the production. Were we, however, to assume the cost price of the rails at £5. 10/ per ton, then we should find that if 1000 tons were sold at home and one-half abroad the profit on the former would £75,000, as against £52,000 loss on the latter, or a total net profit of £23,000. If two-thirds were sold at home and one-third abroad, the figures would be as £104,000 to £35,000, or a total profit of £71,000. In the former case (half and half) the profit would not be so good under the changed conditions as in the previous year when working for the home trade only, and in the latter case (two-thirds and one-third) the increased profit is due to the increase in home demand, and not to the foreign extension. Again, if we fix the cost of production as low as £5 per ton, under a half and half system the gain would be £104,000 in the home trade and the loss £26,000 on the foreign trade, or a total profit of £88,000. On the two-thirds and one-third system the figures would be £140,000 to £17,000, or a total gain of £125,000. Such colossal profits as these are, however, much beyond the mark, as is evidenced by the balance sheets before referred to.

The analysis of the foregoing figures lead us to the conclusion that somewhere midway

between the home and the export price lies the actual cost per ton. From this the fact comes plainly before us that the German manufacturer is willing to largely sacrifice his profits, for the present at all events, in order to gain foreign business. The fact is equally plain that the German taxpayer not only pays some 30/ to 40/ per ton more for the rails used in Germany than there is any necessity for him to do, but he also pays a further 20/ to 30/ on every ton of rails exported from Germany, in order, in such instances, to find employment for the manufacturer in pushing a foreign trade. This is a state of affairs which can hardly fail to right itself in the long run, but we will now show how the English rail manufacturer endeavors to perpetuate its existence. For the last two years or so an institution has existed known as the International Rail-Makers' Association. That this association owes any success to popularity would be at once gained, but the absence of this fluctuating article has not interfered with the extent of business done by the association, and, although the middlemen have been ruthlessly shunted off the line, there has not been a ton less of railway metal ordered than was actually required. It may be conceded, therefore, that in this respect union has meant strength, and that the association has prevented rails from descending into the abyss of falling prices; and, moreover, they have used their giant's strength excellently well in that they have not used it tyrannously, and their prices have been fixed at not unfair rates. Notwithstanding which the English rail-maker has "paid dear, very dear, for his whistle." Like Ethelred the Unready, he is buying off the Danes. He is trying to put off the day of conflict, and meanwhile he is paying blackmail where-with his foes may arm themselves.

Trade has been and is still passing through an era of terrible depression and severe competition, which combined causes weed out those concerns unfit to survive. The English rail manufacturer, by combining with Belgian and German makers to maintain an artificial level of prices, is practically assisting the latter to tide over the bad times—in other words, to be in a position to renew their competition in the future. Had matters been left to take their own course, the superiority of English wealth, natural position and tenacity would have caused the foreigner to be vanquished in the open field, and to retire into the shelter of his own barricaded custom house duties. Again, a side issue from the operation of the convention has been to cause a central committee to be perfectly informed as to the sources of all buying, for all inquiries for rails have been forwarded to this committee for examination. Moreover, much valuable information as to the manner and cost of carrying on rail-making works has from week to week come before the same committee, with the result that all this information, most valuable to an enemy, has become the property of our good friends, for the time being, across the Channel, while the gain on our side has been the smallest.

Removal of Sheldon & Co.

For the past two years Sheldon & Co., manufacturers of the Anchor brand of axles, whose works are now located at Auburn, N. Y., have been looking for a new location to which to remove their business. They have at Auburn employed as many as 800 men, and up to February last had a contract in the State Prison at that place, on which they employed about 300 convicts. At that time, however, their contract expired and since then they have been doing their work entirely by free labor. In January last they had the misfortune to have their rolling mill burn down, and this, with the expiration of their prison contract, has determined them upon removing their works to a more favorable point for the manufacture of their goods. Their product being entirely iron and steel axles, the principal recommendations for any point for their business would be a combination of cheap fuel, their supply of steel and pig iron near to them, and an abundance of cheap labor.

After carefully considering all the points to which their attention had been called, comprising nearly every portion of the country, and every class of fuel, including soft coal and natural gas, they have decided that the anthracite coal regions of Pennsylvania combine more advantages than any other locality. They have determined to locate their works at the city of Wilkesbarre, Pa., which is in the center of the anthracite coal region, and in their estimation possesses very great advantages for them. They have procured a lot containing 14 acres, lying very level, but with excellent drainage, and on this are now erecting their buildings, which will consist of a rolling mill about 100 x 140 feet; a foundry, 150 x 50 feet, with storerooms and rattling-rooms, 25 x 75 feet, and a pattern-room of about the same size. Boiler-houses, 100 x 40, and forge or hammer shop, 300 x 90, and a finishing shop, 310 x 100. Between the forge and finishing shop will be the engine-room, which will contain engines of about 600 horse power for driving the two shops, and about 75 feet from the end of the finishing shop will be the storeroom, 60 x 200 feet, and over it their general offices, about 60 x 60 feet.

Besides the buildings named will be the necessary sheds for storage of iron, steel, lumber, &c. The buildings will be so arranged that the iron and steel will go direct from the rolling mill to the hammer shop, be there cut, collared and forged, passing to the end of the shop nearest the finishing shop, where the forgings are inspected and trimmed, and will go direct into the finishing shop, where the machinery will be so arranged that the minimum of handling will be secured, the forging, boxes and nuts working through the shop in such a manner that they do not go backward, but work together to the end, where the axles are inspected and put up, going from there across into the storeroom, where they will be packed and shipped. Wilkesbarre has very fine railroad facilities, having no less than seven railroads, namely: the Pennsylvania Railroad, Lehigh Valley, Delaware and Hudson Canal Co., Delaware, Lackawanna and Western, Philadelphia and Reading, New Jersey Central, Erie and Wyoming

The Kilbourne & Jacobs Mfg. Co.

COLUMBUS, OHIO, U. S. A.,

New York City Office, 100 Chambers St.,

MANUFACTURERS OF

Road Scrapers, Excavators, Trucks & Wheelbarrows

OF ALL KINDS.

THE "COLUMBUS" ROAD SCRAPER

Is pressed from *one solid sheet of heavy steel*, and is the strongest and most durable Road Scraper made.

Used in making railroad embankments, excavating for canals, ditching, &c. The largest contractors in the United States have used them exclusively for years.



THE "COLUMBUS" SOLID STEEL ROAD SCRAPER.

We make three sizes of these Scrapers. No. 1, capacity, 7 cubic feet of earth. No. 2, 5 cubic feet of earth. No. 3, 3½ cubic feet of earth. Furnished with or without *solid steel shoes or runners*, as desired. The bails are of refined iron, with strong and perfect working swivels. Bowls nest and handles crate compactly for shipment.



RAILROAD OR CANAL BARROW.

With Jacobs' Patent Wood Wheel. Bent Tray, full sized, planed and well finished.



RAILROAD OR CANAL BARROW.

Same as above, except with Jacobs' Patent Steel Spoke Wheel.



ORE OR MORTAR BARROW.

With Jacobs' Patent Wood Wheel. All hardwood. Bowl dovetailed together and firmly nailed.



OPEN BOTTOM BRICK BARROW.

With Jacobs' Patent Wood Wheel. Folds for shipping same as Garden or Farm Barrow.



TIGHT BOTTOM BRICK BARROW.

Same as above except having Closed Bottom. We furnish either style of these Barrows with *Steel Spoke Wheel* when specially ordered.

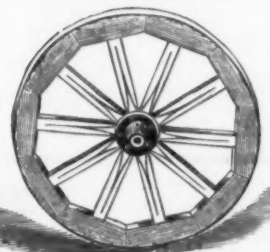


WOOD OR BARK BARROW.

Wheel same as above. Body and Dash strapped with heavy iron. Well finished. For Wood, Bark, Bales, Boxes, &c.

JACOBS' PATENT WHEELS.

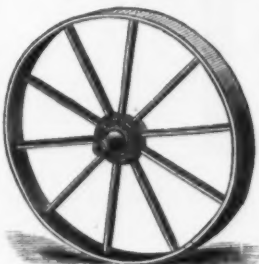
The Strongest and Lightest Running Wheel known.



It will not Shrink in any Climate. The Tire Cannot Come Off.

It has TEN spokes of thoroughly seasoned wood, and each spoke is supplied with a separate felloe. The hub is of chill cast iron, and riveted firmly to the spokes, which are so cut as to counterbrace each other. The spokes are keyed from the center after the tire is shrunk on. *This wheel will not shrink or give in any weather or climate, and the tire cannot become loosened.* An oil hole is drilled into the hollow washer of the hub, and the oil distributes itself along the bearings while the wheel is in motion. The wheel revolves on a fixed shaft or axle, which passes through the end of the handle, and is a brace to the barrow. This wheel cannot be broken or weakened by ordinary usage, and will last a lifetime. It is well painted. *We guarantee it superior to any other WOOD WHEEL.*

JACOBS' PATENT STEEL SPOKE WHEELS.



Wheel Complete.

Wrought-Iron Tire Steel Spokes.

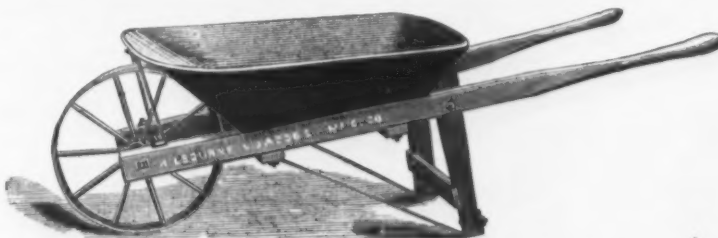


Without Hub—Showing Construction.

These wheels are so constructed—having spokes tightened from center—that the tire cannot come off or the spokes become loosened. Hubs hardened on inside. Oil hole in hub. Diameter of wheel, 17 inches. Wrought-iron tire, 1½ inches wide. *Steel spokes. The Best Barrow Wheel Manufactured.*



The above cut shows the manner in which our *Railroad, Ore, Wharf and Steel Tray Barrows* are packed for shipment. This insures lowest rate of freight, and they can be quickly and easily set up by following the simple instructions sent with each half-dozen Barrows. In this shape Barrows require much less room for storage, and can be as easily set up as if received with Tray fastened to Frame.



"COLUMBUS" STEEL TRAY WHEELBARROWS.

The Tray is stamped from *one solid plate of steel*. Steel Spoke Wheels 17 inches in diameter. Wrought-Iron Tire, 1½ inches wide. These Barrows, while much *lighter* than those having iron frames, are *equally strong* for all practical purposes, and will stand the roughest usage. Two sizes. No. 1, capacity 3½ cubic feet, for Earth, Sand, Ore and Foundry use. No. 2, capacity 5 cubic feet, for Coal, Manure, Sawdust, Ashes, &c. Pack for shipment same as R. R. Barrow.



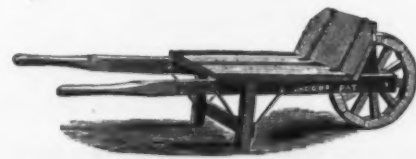
GARDEN OR FARM BARROW.

Set Up.

Double Frames and so constructed that by simply removing one bolt (the axle) and two nuts they can be folded flat down (see cut) and shipped at lowest rate of freight. Three sizes.



Folded for Shipping.



STRAIGHT HANDLE STONE BARROW.

With Jacobs' Patent Wheel. Strong, well-made, iron strapped over bottom and bolted together. For stone or pig iron, &c.



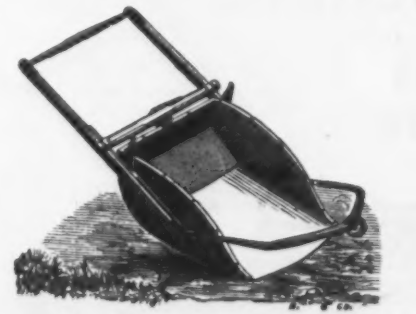
BENT HANDLE STONE BARROW.

With Jacobs' Patent Wheel. 17½-inch tire. Well ironed and bolted. Extra strong.



STEEL BOTTOM STONE BARROW.

Bottom and Dash formed of *one plate of steel, one-fourth of an inch thick*. Steel Spoke Wheel. The strongest and best Stone Barrow manufactured. Very durable.



THE AUTOMATIC REVOLVING ROAD SCRAPER.

Three sizes. 30, 33 and 36 inch. Both Steel and Wooden Bottom.

and Lehigh and Susquehanna. The lot which they have selected is reached direct by all of these roads, which have already laid branches into the works. For fuel they will utilize the culm, of which there is an endless supply within easy access, there being three large collieries within a quarter of a mile of their works, and one of them not over 800 feet from their lot line. They have machinery in their present works which, when placed in their new plant and operated by free labor, will easily give them a capacity of 1600 sets of finished iron and steel axles per day, or, by running their works night and day, they can easily produce 2500 sets. This is said to be at least five times the capacity of any axle manufactory in the world. They contemplate, in addition to the works which they will now erect, adding a plant for manufacturing their own steel, and this will place them on an entirely independent footing.

INDUSTRIAL ITEMS.

NEW HAMPSHIRE.

The S. C. Forsaith Machine Co., Manchester, have been constantly adding to their force for the past two months, and, although running 12 hours per day, cannot keep up with their work.

MASSACHUSETTS.

The new twist drill company at Taunton expect to start up this week with 10 machines. Each machine will turn out as many drills in one day as can be prepared for the market in three days, and by this at least \$9000 has been saved in machinery alone over those concerns who use the old-style machinery.

The Valley Machine Co., Easthampton, have increased their hours of labor to nine hours a day.

Boston parties are trying to lease a part of the cotton-mill property at Athol for the manufacture of insulators and door-knobs.

RHODE ISLAND.

The Miller Iron Co., manufacturers of the Miller grate bar, have built new works on Harris avenue, Providence, and will soon move their entire business to that point.

CONNECTICUT.

The Windsor Locks Steel Co. have a dual existence, the foundry being situated at Windsor Locks, while the wharf and office are at Bridgeport. The foundry was started in 1820 as the Ripley Iron Works. They are now running 22 hours per day, with two gangs of men.

The Bridgeport Brass Co. are making shipments of their insulated wire to Norway, Germany, Mexico and South and Central America.

The receiver of the Wilson Sewing Machine Co., of Wallingford, has been authorized by the courts to sell the machinery and real estate.

Sterling Foundry Co., Greenwich, \$12,000 capital, have been incorporated.

NEW YORK.

Mr. Chas. Nordhaus, 13 Cedar street, announces that he has accepted the American agency of Volkart Brothers, of Colombo, Coochin, Tellicherry, Bombay, Kurachee, Tuticorin, Wintertur and London, and will give special attention to the execution of plumbago orders at Colombo.

NEW JERSEY.

The New Jersey Steel and Iron Co., Trenton, will change their machinery and erect new buildings for the manufacture of steel by a new improved process; estimated outlay, \$100,000.

The Morris County Machine and Iron Co. recently shipped a lot of machinery and pumps to a silver mine in Mexico, including a clock-valve and case for a Cornish pump, weighing 4700 pounds, which was probably the largest valve ever sent to that country.

PENNSYLVANIA.

Sheridan Furnace for the week ending November 21 produced 807 tons of pig iron.

Last Friday the Glendon Iron Co. set off another of their big blasts in the limestone quarries at Glendon. It was the most complete of any they have yet made, resembling a small earthquake in its effects and throwing out an immense quantity of broken stone. The charge consisted of 10 tons of Judson powder, placed in a tunnel. It is estimated that 150,000 tons of stone were dislodged—a quantity sufficient to supply the furnace for several years. Capt. Joseph Matchette, of Catawauqua, furnished the powder.

Fannie Furnace, at West Middlesex, was blown in last week by the Wheeler Furnace Co. The stack has been raised 10 feet and other improvements made. This furnace has been idle since last December.

The Ellis & Lissig's Steel and Iron Co.'s mill, at Pottstown, is running steadily with 125 men and plenty of orders. They have added 40 additional nail machines and now have a total of 100.

The amount of iron produced at Robeson Furnace before last was 910 tons, and last week 780 tons. This is considered a very large output. The ore used was taken from the Cornwall Mines.

The pay-rolls of the Catawauqua Mfg. Co. for the month of October amounted to about \$17,000, the largest sum paid for several years.

The puddlers at the Sharon Iron Works are out on a strike on account of the refusal of the company to pay an advance of 50 cents per ton extra for working muck billets.

The Chester Pipe and Tube Works, which have been idle for about two years, have resumed operations with a full complement of workmen.

Several representatives of the syndicate recently organized by Franklin and Old City capitalists to supply natural gas to Western

Pennsylvania were in Sharon last week and conferred with prominent citizens in regard to bringing gas to Sharon. It will cost \$300,000 to lay pipe from the oil field to Sharon, a distance of 40 miles. The large mill at Wheatland would resume immediately, it is said, if cheap fuel could be obtained.

The Phoenix Bridge Co., Phoenixville, have contracted with the New England and Southern Railroad Co. for the construction of 26 miles of road, including the erection of a bridge across the Hudson River, at Storm King, near West Point. The bridge will be 235 feet above high water.

The mill of the Reading Iron Works Co. is now being run at its greatest capacity, with numerous large orders for contract work on hand that will keep it busy for at least a year.

Rhodes & Co., of Cleveland, Ohio, have leased the Ella Furnace, at West Middletown, near Sharon, and will put it in blast in a few days.

The Northampton blast furnace, recently leased by the Bethlehem Iron Co., has been overhauled and repaired. It will soon be put in blast.

Hon. E. A. Wheeler, of Sharon, has received a letter from the English inventor and capitalist, Mr. Alfred Davy, stating that he will return to America in the spring and superintend the erection of an experimental steel plant in Sharon or Pittsburgh, as circumstances offer. Mr. Davy spent several weeks in Sharon during the past summer, and transferred to a local company the right to control the patent in the United States. Mr. Davy has received notice from Washington that every application for patents has been granted. He has recently made many improvements on the process.

The nail works at Pottstown are very busy and the mills are running day and night. At the works of the Pottstown Iron Co. the demand for nails far exceeds the capacity of the mill. There are 95 machines in operation and 250 men at work.

The rivet mill connected with the works of the Phoenix Iron Co., at Phoenixville, was destroyed by fire last week. Considerable stock and machinery were damaged. The loss is estimated at \$10,000.

The Loyalhanna Coal and Coke Co., of Latrobe, will do away with mule power and haul their coal to the mouth of the pit by cables. The machinery is now being placed in the mine.

A large window-glass factory will shortly be erected at Canonsburg.

It has been decided to remove the Penn Diamond Drill Works from Pottsville to

necessity of 10 per cent. more going in blast was on account of the furnaces in the Mahoning and Shenango valleys going to work.

The proposed strike among the employees of the National Tube Works Co., at McKeesport, will not take place, as the company have increased the wages of the men from 3 to 15 per cent. The works are running to their full capacity, as high as 30 cars of pipe being shipped some days.

H. T. Bostwick & Co., Pittsburgh, have received an order for 80,000 pieces of brass.

James Rees & Sons, Pittsburgh, are making for Brace Bros. two new steel boilers known as the "marine tubular" style, each with 45 horse-power. A 100-horse-power tubular boiler is to be made for the new opera-house of John Dubois, at Dubois, in Clearfield County.

The employees of Wilson, Walker & Co. have organized a mutual benefit association.

The cutlery works at Beaver Falls resumed operations on Monday, after being shut down for almost two months. They will run about half force only and will only run long enough to fill up odds and ends of stock.

Mr. Westinghouse, of Pittsburgh, has made an offer to the stockholders of the Westinghouse Machine Co. to advance \$175,-

formerly known as the Novelty Works, which have been idle for some weeks, will be put in operation shortly.

The Square Hole Auger Co., Wooster, have recently purchased the building and plant owned by Messrs. Wm. Spear & Son, of that city, the dimensions of which are 40 x 80 feet, which will be fitted throughout with new special machinery to manufacture their square-hole auger machines. They expect to have everything in readiness to turn out their improved machines by January 1, 1886.

The Sidney Steel Scraper Co., of Sidney, proprietors and manufacturers of Haslup's patent wheeled and drag scrapers, steel bob sleds, &c., have recently built a large brick factory, and are adding some improved machinery suitable for their business. Their new steel bob sleds are in great demand, as they are lighter, run easier and are much stronger than the cast iron. They are now behind their orders on the bob sleds, but expect to be able in the near future to fill all orders promptly.

Smith, Vaile & Co., Dayton, have just been awarded the contract for the water works machinery at Troy, Ohio, and at the State Penitentiary at Jackson, Mich.

ILLINOIS.

The Secretary of State has recently issued a license of incorporation to the Chicago

be put to work at an early day. Their output of steel amounts to 100 tons per day. When the works are in full blast it is expected the output will be between 200 and 250 tons per day.

The Missouri Car and Foundry Co., St. Louis, are now very busy in all departments; in their foundry they are producing about 200 car-wheels a day, in addition to other castings. Their car shops, which lately received a contract from the Missouri Pacific Railway for 900 cars, will build 1000 more cars for live stock and coal for the same road. It is also reported that this road have placed an additional contract with the company for 300 coal cars.

TENNESSEE.

It is stated that the Standard Charcoal Co., Centerville, which manufacture alcohol from wood, are to erect an iron furnace and use the surplus gas in the manufacture of pig iron.

The Chattanooga Foundry and Pipe Co. are arranging to make extensive improvements very soon. The capacity of the works will be increased fully one-third. The company recently sold 130 carloads of pipe to the Selma Water Co.

KENTUCKY.

The Peerless Mfg. Co., of Louisville, who manufacture the Rice sand molding machine, are temporarily occupying the small foundry shop on Ninth street, near Main, which they have fitted up in complete order, and are now very busy finishing some of their first machines. B. F. Avery & Sons have ordered several, which will cause a saving of about \$200 per week in their molding shop. These machines are specially adapted to molding hollow-ware. This company are also placing on the market a superior quality of bridge washers made by their machines, and cast from the same metal as their machines are made of. The Peerless Mfg. Co. intend, in addition to the manufacture of their machines, to operate some of them and turn out a full line of stove hollow-ware.

ALABAMA.

The Salem City Council have contracted with the Jerry Electric Light Co. to light the city for \$3500 a year, and works will be built at once. The Tompson-Houston Works, at Birmingham, are almost ready to commence operations.

A practical man in New Jersey has been writing to Birmingham for the names of moneyed men who might go into the manufacture of glassware with him. He says he can prove that Birmingham can make glass as cheaply as Pittsburgh can, even with natural gas.

The Southern Bridge Co. have been incorporated at Birmingham, with \$25,000 capital and an authorized increase to \$100,000. They propose to make iron and wooden bridges and iron fences.

Somebody has been quietly buying up the street railroad company's stock at Tuscaloosa, and it is supposed that an important extension of the road is intended.

A remarkably strong concern has been organized at Birmingham under the name of the Smith Sons' Gin and Machinery Co., to make cotton-gins and presses especially. Col. Enoch Ensley and Col. J. W. Sloss, presidents of the Pratt Coal and Iron Co. and the Sloss Furnace Co. respectively, are directors.

There is promise of the removal of a Pennsylvania foundry and machine shop firm to Talladega. The same town has a fire brick company as a new enterprise.

With regard to the silver question, Mr. Cannon, Comptroller of the Currency, at Washington, says: "The discontinuance of the coinage of the silver dollar by our Government might perhaps have a tendency to bring about some agreement with other nations and the fixing of a standard for a series of years. It is, however, evident that the coinage of the standard silver dollar under the present law is in excess of the requirements of the country and should be discontinued. If we continue to add these dollars to our circulating medium and they continue to accumulate in the Treasury, the Government must of necessity pay some portion of its obligations in that coin; and if the Government should pay its interest and other obligations and redeem its bonds in standard dollars the business of the country would immediately go to a silver basis. What effect this would have it is difficult to predict. It would appear, however, that gold would go to a premium, which would compel its being held to a certain extent as an article of merchandise, and it would not circulate as money. This would probably occasion contraction in credits and financial disturbance. The effect upon the legal tender notes, which, by the term of Section 12 of the act of July 12, 1882, appear to be redeemable in gold, cannot well be foreseen; but it would be difficult for the Government, with its present stock of gold, to redeem the outstanding legal-tender notes, or such portion of them as might be presented, if gold was held at a premium. Inasmuch as the national bank notes are redeemable in legal-tender notes, their position would be determined by the status of the latter."

England secured Port Hamilton, on the Asiatic Coast, by a masterly stroke of policy. Her design was to secure a strategic point which should enable her to dispute with Russia for naval as well as commercial supremacy on the Pacific. Port Hamilton is three days' steaming from the Russian stronghold Vladivostok, and one day from Takosima, the great submarine coal mine of Japan. A Port Hamilton correspondent says: "Fifteen years ago Vladivostok was a wilderness; to-day it is the Sebastopol of the East, a standing menace to our trade, and even throwing its shadow across the Pacific to Vancouver, the most defenseless of all our colonies. Under these circumstances, and as a mere matter of self-defense, the occupation of Port Hamilton was decided upon."

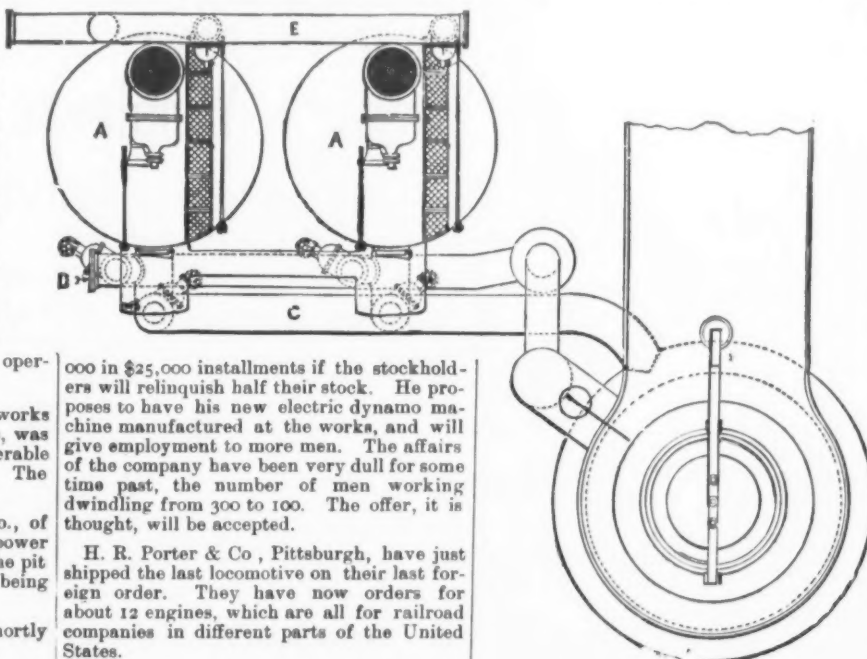


Fig. 4.—General Plan of Plant.

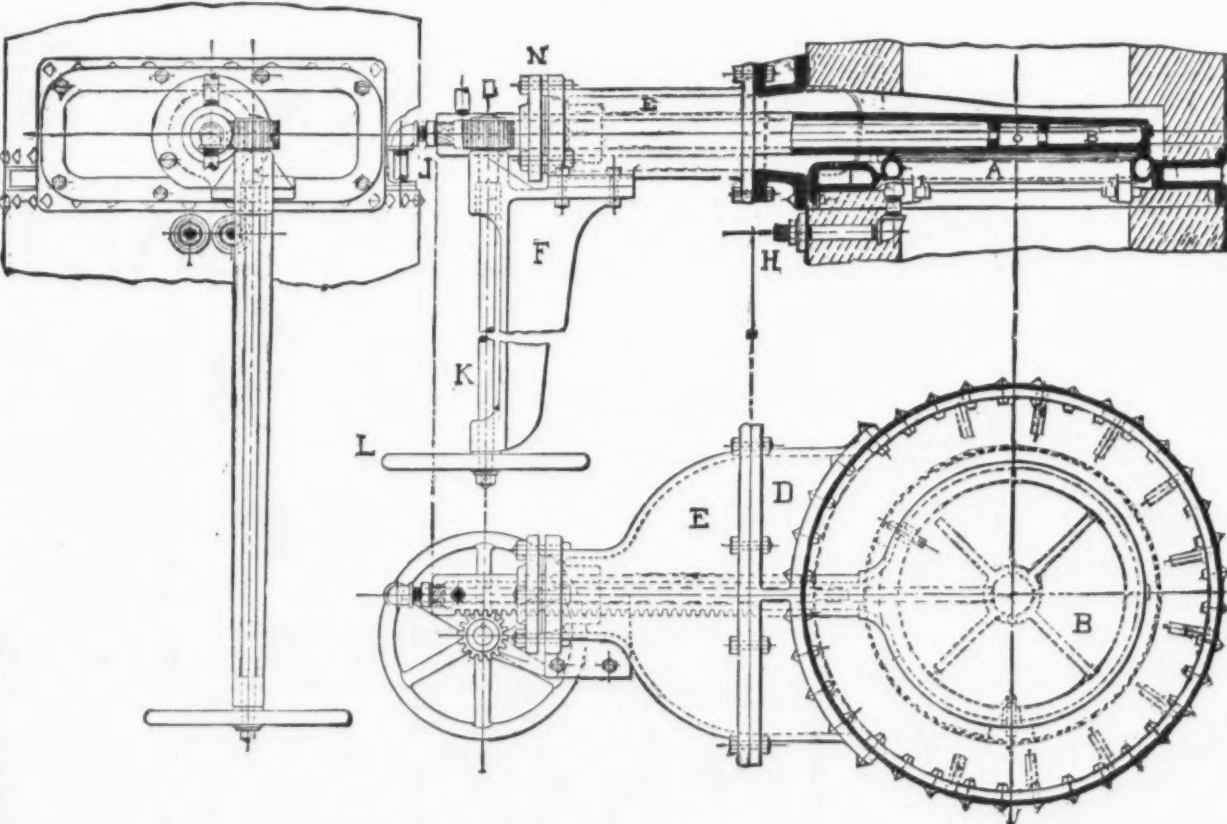


Fig. 5.—Details of Hot-Blast Stove.

THE GORDON THREE-PASS HOT-BLAST STOVE. (See page 1.)

Birdsboro. The company have been employing about 50 mechanics and paying out \$3000 to \$4000 a month in wages.

The Lehigh Coal and Navigation Co. have declared a semi annual dividend of 2½ per cent., payable December 8th.

PITTSBURGH AND VICINITY.

A letter was received in Pittsburgh last week from the Mayor of Gallipolis, Ohio, and the statement was made that the writer had been authorized by E. Betz, a councilman of the town, to offer the nailers an advantageous site of 4 acres and \$25,000 in money if they would locate their nail factory there. It is intended that the company shall have a capital stock of \$50,000, to be divided into shares of \$100 each. Nearly all of the subscribers will pay in a portion of the amount due, and then give up half of their salary until the claim is paid off.

The Southside manufacturers, who are forming a company to build a new bridge across the Monongahela River, are trying to secure the charter of the Fifth Avenue Bridge Co. That charter was granted in 1871, and is very liberal.

Another 10 per cent. of the coke ovens have been ordered on by the syndicate at Pittsburgh. There are now 80 per cent. of the syndicate's ovens in blast, and it is anticipated that the remaining 20 per cent. will be ordered on within a few days. The

mills of McKee, Anderson & Co., at Beaver Falls, by Mr. Whittaker and other capitalists of Wheeling. In the articles of agreement the new company is called the Beaver Falls Iron Co. In the meantime the mills are being put into shape preparatory to resuming operations.

The lining has all been removed from the Soho Blast Furnace of Moorehead, McCleane & Co. The furnace was blown out on September 10. The work of relining will not be resumed for several months, as the large supply of metal that is yet on hand is enough to supply the mill for at least six months.

OHIO.

We learn that Cleveland, Brown & Co., of Cleveland, will be in the market at an early day for 30 miles of large pipe to conduct the natural gas from Butler County, Pa., to their large iron works in Youngstown, Ohio.

The property of the Steubenville Bottling Co. was sold last week to the Sumner Glass Co., of Sharpsburg, Pa., for \$4000. The new company will operate the works in the manufacture of bottles.

The sheriff sold at public sale last week the Rush Run Coal Works, situated at Rush Run, Jefferson County, for \$5343. W. P. Hays, of Steubenville, was the purchaser. The works will be put in operation shortly.

The foundry and machine shops of the McAndrews Sanitary Co., at Youngstown,

Nut Lock Co., at Chicago; capital stock, \$250,000; incorporators, Henry G. Savage, Charles E. Davis and Charles K. Luce.

The Chicago Die and Machine Works have received a foreign order for a number of their dies and presses.

The Riverside Steel Casting Co., makers of crucible steel castings, are a new enterprise who have just taken possession of the old Phoenix Iron Foundry, in Chicago. They are building new furnaces for melting steel and are putting in annealing ovens. The officers of the company are: C. W. Pierce, president; W. S. Brewster, vice-president; J. F. Brown, secretary and treasurer, and H. H. Pierce, general manager. The capital stock is \$250,000.

INDIANA.

The Shumard Sash Balance Co., Richmond, are running overtime to fill orders. They have received an order the past month from the Chicago and Alton Railroad for 700 balances for fitting cars on that road.

MISSOURI.

The Western Steel Co. are getting their works at Carondelet in good running order. One of the furnaces was fired up about the 1st of September, and by the time the steel department was put in operation two weeks ago had a good supply of iron on hand. The steel department is running single turn for the present, but two sets of hands will

FORBES' PATENT ACME CLUB SKATE.

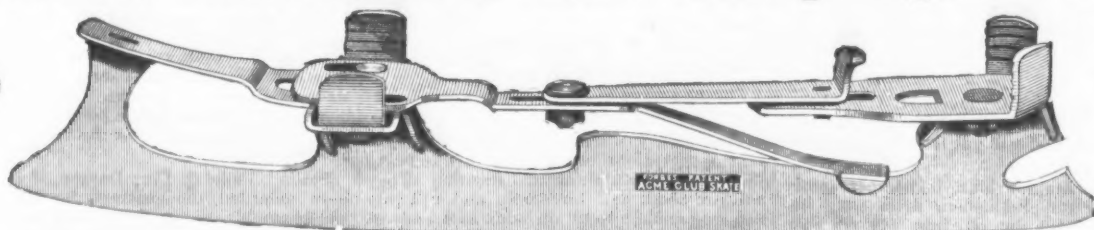
THE ORIGINAL AND ONLY ACME ICE SKATE.

MANUFACTURED BY

The Starr Manufacturing Company, Halifax.

DAME, STODDARD & KENDALL, Sole Selling Agents for the United States.

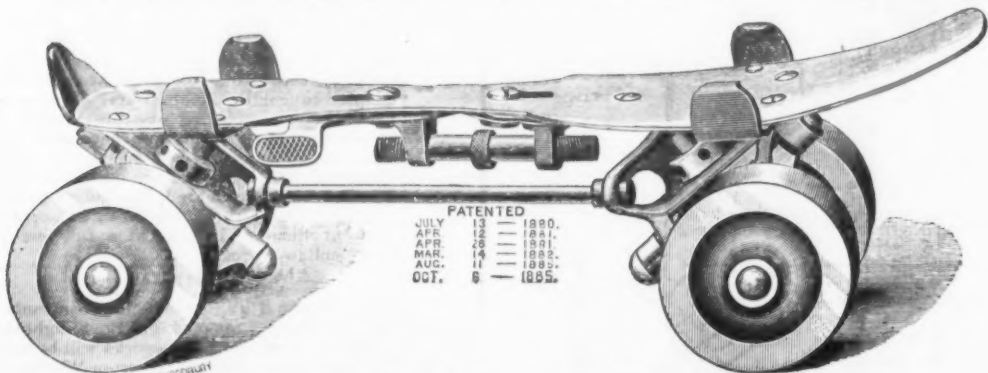
Universally Acknowledged the
Best Self-Fastening Skate
Ever Invented.



Retains the First Place and
Foremost Rank for Demon-
strated Superiority.

The same standard of excellence of quality and finish will be maintained in the manufacture of these Skates. We feel confident that an inspection will convince that the **FORBES ACME SKATES** are superior in quality and finish to any imitation patterns.

We have largely reduced our prices from those of last year.



The Vineyard "All-Clamp Lever" Roller Skates No. 7.

The fastening of this Skate is so constructed as to open wider and draw closer together than any Skate yet put on the market. This Skate, as shown in cut, has an adjustable nut and screw connected with box containing *Rubber Spring* to regulate the rocking of the *Roller Carrier* to suit the requirements of the Skater. The No. 5 style of this Skate is of the same general design as No. 7, without the attachment for regulating roller carrier mentioned in description of No. 7.

CATALOGUE WITH PRICES OF THE ABOVE SKATES SENT ON APPLICATION.

DAME, STODDARD & KENDALL,

Successors to BRADFORD & ANTHONY,

SELLING AGENTS.

BOSTON, MASS.

VICTOR ROLLER SKATE CO., MUNCIE, IND.,

MANUFACTURERS OF THE CELEBRATED SELF-LUBRICATING ANTI-FRICTION

CLIMAX ROLLER SKATES.

Send for Trial Sample Pair.



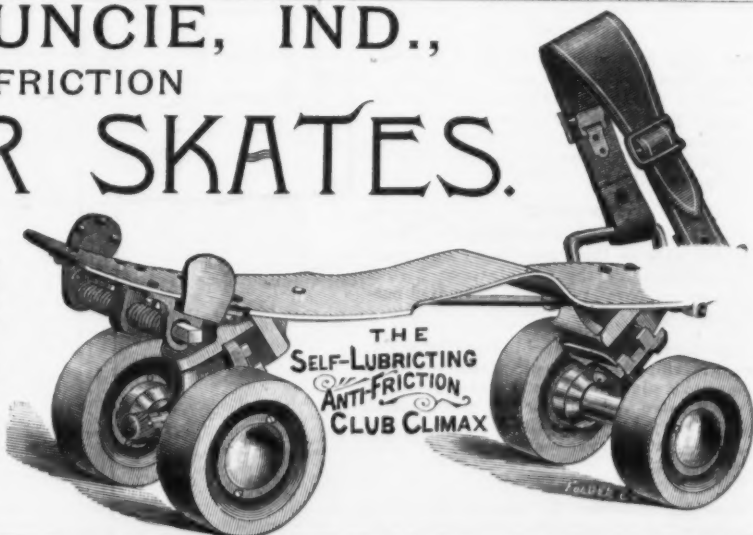
The axles revolving in the cylinders, which are cored and recessed, having an oil valve attached to each center, and the wheels having an outside and inside Oil Guard, with sectional bushing, leaving oil space between, make them positively the only clean, self-lubricating and anti-friction Skate ever offered.

The post and socket or vertical motion provided with a tension gives them the most scientific movement (pronounced so by leading experts) of any Skate heretofore offered to the public.

For beauty, cleanliness, simplicity, durability, symmetry and light running it rivals all competitors, and stands, as its name implies, the "CLIMAX" of all Roller Skates.

Liberal discount made to the Trade.

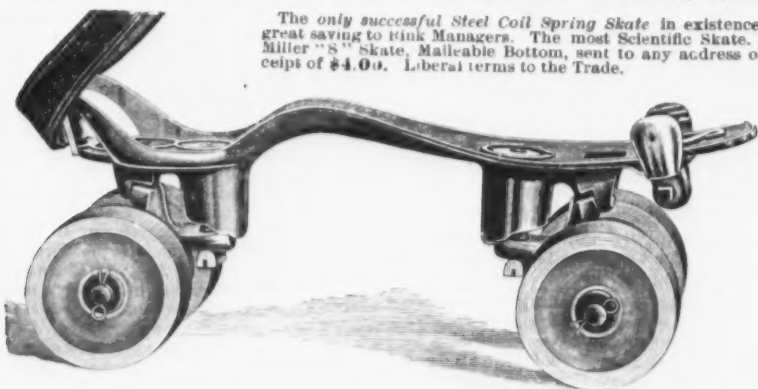
Our new Illustrated Catalogue and Price List mailed free upon application.



The Miller Champion Roller Skate,

MANUFACTURED BY THE

JAMES P. SMYERS ROLLER SKATE CO., Hamilton, Ohio.



Send for Circulars and Mention this Paper, Please.

EXCLUSIVELY **HAND-CUT FILES and RASPS.**

MANUFACTURED BY

THE CHELSEA FILE WORKS

NORWICH, CONN.

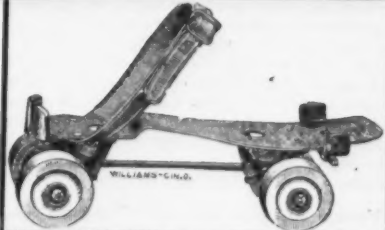


The superiority of our Horse Rasps over all others is universally admitted by those who use them, and their high degree of excellence will be scrupulously maintained. Give them a trial and use no others.

The CELEBRATED CROCKER ROLLER SKATES.



THE
Latest
AND
BEST.



Used by the

Leading
Experts

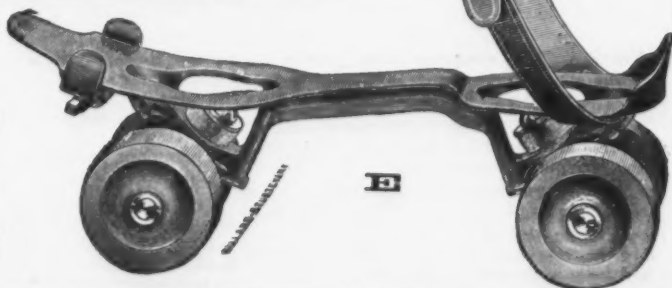
AND

RINKS

Throughout the

United States

and Canada.



FRANK L. CROCKER, MFR., Minneapolis, Minn., U. S. A.

SEND FOR
Illustrated Catalogue

AND
PRICE LIST.

LIBERAL DISCOUNT TO JOBBERS
AND DEALERS.

Canadian Factory, TORONTO, ONT.

Little Giant Nut Crack,

FULL NICKEL-PLATED.

For Sale by all Dealers.

MALBY, CURTIS & Co., General Agents, 20 Warren St., New York.



FULL SIZE.

Send for Prices.

Sample by mail, prepaid, 50 cents.

Manufactured only by the ACME SHEAR CO., Bridgeport, Conn., U. S. A.

Coke in Pennsylvania.*

BY JOS. D. WEEKS.

(Continued from page 19, November 5.)

Beaver District.—The coke industry in the Beaver district, which includes the counties of Beaver and Lawrence, is of but little importance. The ovens in Beaver County are located at three small coal mines, and are only nine in number. The Lower Kittanning coal is coked. The seam is 2 feet 4 inches, with a thin slate parting of 1 inch. There is quite a difference between the two benches. The upper is a hard, dull, open-burning coal, and contains some pyrites, while the lower is a bright, oily, soft, coking coal. Much of the lower coal comes out as slack and is coked, producing a firm, silvery, cellular coke, which is used at the Beaver Falls manufacturing. The analyses of the Beaver Falls coal and coke from the lower bench are as follows:

	Coal.	Coke.
Fixed carbon.....	54.619	84.727
Volatiles matter.....	38.110	0.633
Ash.....	4.080	12.639
Sulphur.....	0.791	1.994
Water.....	2.400	0.010
Total.....	100.000	100.000

In Lawrence County there are two coke works, neither of which was in operation in 1884, and one of which has been idle the entire time covered by this report. This latter works was built to utilize the slack from the coal mines in the vicinity of New Castle, but difficulty was found in keeping the ovens supplied with slack, and they have been idle, as noted. The coal coked at the Wampum Furnace was the Darlington coal, or Upper Kittanning, the most important and persistent of the Lawrence County coals of the lower productive series. Both of the coke works in Lawrence County are much dilapidated, and would require extensive repairs before they could be again put in operation. The Wampum ovens are regarded as abandoned. The following are the statistics of the manufacture of coke in the Beaver district for the years from 1880 to 1884:

	1880.	1881.	1882.	1883.	1884.
Number of establishments.....	5	5	5	5	4
Ovens built.....	106	106	106	107	89
Ovens building.....	0	0	0	0	0
Coal used, short tons.....	8,013	6,887	11,099	19,510	2,250
Coke produced, short tons.....	4,880	4,333	7,960	12,315	1,390
Total value coke at ovens.....	\$10,150	\$9,012	\$15,134	\$21,062	\$2,108
Value coke at ovens, per ton.....	\$2.08	\$2.08	\$1.90	\$1.70	\$1.56
Yield of coal in coke, per cent.....	61	63	68	64	62

Allegheny Valley District.—In this district are included the ovens of Armstrong and Butler counties and those at one works in Clarion County. In Armstrong County there are three coke works, supplying coke to blast furnaces connected with them. At Kittanning the Kittanning Iron Co., Limited, have 66 ovens, the only ones in the county, the coke at the other two works being made in open ricks on the ground. At Kittanning the Freeport upper seam is coked (the coal being first washed), producing a fuel that answers the requirements of the furnace practice. This same seam is coked at Stewardson Furnace and Mahoning Furnace. The coking is badly done, in open-air ricks, requiring from 8 to 12 days in the operation, according to the state of the weather. The coke is tender, but the furnaces in which it is used are small, and great burden-carrying powers are not necessary. Analyses of the coal and coke are as follows:

	Stewardson coal.	Mahoning coal.	Kittanning coke (washed).
Fixed carbon.....	55.545	54.996	87.22
Volatiles matter.....	35.530	34.810	11.43
Ash.....	6.639	7.690	1.83
Sulphur.....	0.835	1.054	1.33
Water.....	1.470	1.450	—
Total.....	100.000	100.000	99.88

In Butler County there are three coke works, one of which is of little importance. Each of the other two has 50 ovens. One bank of 50 ovens has been in operation since 1882. The other was built during 1884, only beginning operations in December. But little information could be secured as to the coke or coal. The seam used is perhaps the Clarion. The coke finds a market in Northwestern Pennsylvania and Eastern Ohio, at foundries, iron works, &c.

The following are the statistics of the manufacture of coke in the Allegheny Valley District of Pennsylvania, for the years from 1880 to 1884:

	1880.	1881.	1882.	1883.	1884.
Number of establishments.....	5	5	6	6	7
Ovens built (of).....	97	109	159	159	309
Ovens building.....	0	0	0	0	0
Coal used, short tons.....	45,355	55,075	70,000	64,810	55,110
Coke produced, short tons.....	23,470	29,650	41,897	34,868	31,480
Total value coke at ovens.....	\$49,628	\$64,664	\$80,214	\$62,982	\$54,859
Value coke at ovens, per ton.....	\$2.10	\$2.18	\$1.92	\$1.81	\$1.75
Yield of coal in coke, per cent.....	52	53	55	54	57

The most important of the coke producing districts of the Allegheny Valley is in Clarion County. In this county there are three coke works, all situated on Red Bank Creek, the dividing line between this and Armstrong County. The oldest of these is at the Red Bank Furnace, situated at the junction of the Allegheny River and Red Bank Creek. At these ovens coke is made from the Freeport upper coal, which is found in what is termed a "4-foot bed," but does not average that thickness. There are sharp local variations, the coal in some places being but 2½ feet thick. An analysis of the coke is as follows:

	Per cent.
Fixed carbon.....	88.100
Volatiles matter.....	1.106
Ash.....	9.228
Sulphur.....	1.076
Water.....	0.290
Total.....	100.000

* From advance sheets of the "Mineral Resources of the United States." Published by the United States Geological Survey.

The coke is dull gray and of an open structure, with small masses of slate. Statements regarding the ovens near Fairmount City, the other two works in this county, will be found under the head of the Low Grade District.

Low Grade or Bennett's Branch District.—The low grade division of the Allegheny Valley Railroad, or the Bennett's Branch, as it is sometimes called, runs northeasterly from Red Bank Junction to Driftwood, through Clarion, Jefferson, Clearfield and Cameron counties. Along the line of this road there are six coke works—two in Clarion County, one in Jefferson, two in Clearfield and one in Cameron. Most of these works use only slack.

The following are the statistics of the manufacture of coke in the Low Grade District of Pennsylvania for the years from 1880 to 1884:

	1880.	1881.	1882.	1883.	1884.
Number of establishments.....	3	4	5	6	7
Ovens built.....	117	125	177	229	321
Ovens building.....	0	2	0	0	0
Coal used, short tons.....	45,055	90,489	87,314	76,380	120,151
Coke produced, short tons.....	28,090	44,350	41,709	37,044	78,546
Total value coke at ovens.....	\$46,359	\$80,785	\$80,339	\$65,584	\$113,155
Value coke at ovens, per ton.....	\$1.65	\$1.85	\$1.90	\$1.77	\$1.44
Yield of coal in coke, per cent.....	62	44	51	48	49

The two works in Clarion County make coke from the Lower Freeport bed, the seam averaging 6 feet. The slack is mixed with considerable slate and fire clay, and requires careful washing. The Stutz washer is used. The ovens at Fairmount City were erected in 1879; those in Porter Township in 1882. The following are analyses of the coal and coke from Fairmount City:

	Unwashed slack.	Washed slack.	Coke.
Fixed carbon.....	51.397	54.223	85.777
Volatiles matter.....	35.130	35.825	0.623
Ash.....	10.225	7.340	11.463
Sulphur.....	1.088	1.312	2.107
Water.....	1.360	1.300	0.300
Total.....	100.000	99.900	100.270

The coke is hard, bright, silvery, of rather an open structure, with small masses of slate included, takes the blast easily, and has a good reputation for both foundry and blast-furnace use.

In Jefferson County there is one works, with 31 ovens, coking slack from the Freeport lower bed. Analyses of the coal and coke are as follows:

	Coal.	Coke.
Fixed carbon.....	62.524	86.95
Volatiles matter.....	30.800	1.42
Ash.....	4.800	7.95
Sulphur.....	0.776	0.90
Water.....	1.100	0.78
Total.....	100.000	100.00

The coking qualities of this coal are not the best, but fair.

In Clearfield County there are two coke works, one in the Reynoldsville gas-coal basin, and the other in the Third bituminous coal basin. At the former slack from the Freeport lower coal is used. The bed is 6 feet thick, at times 8 feet, the coal analyzing as follows:

	Per cent.
Fixed carbon.....	59.904
Volatiles matter.....	32.500
Ash.....	5.400
Sulphur.....	1.256
Water.....	0.950
Total.....	100.000

The coal is firm, bright, and bears transportation well. Owing to a thin parting of soft slate near the bottom of the seam, and which becomes broken and mixed with the fine coal in the operation of undercutting, it was found desirable to wash the slack or fine coal in order to remove this slate, both for coking and smithing purposes, and a washer with two compartments was built several years ago, but in consequence of increased production is now too small and will soon have to be replaced by a larger machine. The coke is bright, of great calorific energy, and capable of sustaining a heavy burden. Coming as it does in direct competition with that manufactured in the Connelville region, its finding and holding a place in market is ample proof of its excellent quality.

Analysis of Clearfield County (Low Grade) Coal.

	Per cent.
Fixed carbon.....	61.653
Volatiles matter.....	31.008
Ash.....	4.950
Sulphur.....	1.497
Water.....	9.400
Total.....	98.559

The coal does not swell much in coking, and forms a hard, compact coke, with a metallic luster. At this works the run of the mine is coked, all being crushed and washed.

There is one coke works in Cameron County, which, however, has not been operated since the fall of 1883, coke production having been stopped at that time owing to the low price.

Blossburg District.—The Appalachian coal field at its northern extremity breaks into a number of small, detached coal basins. The best known of these is the Blossburg, in Tioga County, a canoe-shaped syncline some 20 miles long and 3 wide. From the slack coal produced in mining in this basin considerable

erable coke is made, there being in this county, at the close of 1884, 344 ovens built and the foundations and walls for 32 more. The first attempts, made some years since, to coking the Bloss coal were failures, and it was generally agreed that it could not be successfully coked. Some nine or ten years since more careful and skillful experiments were made, demonstrating that the slack coal, properly washed, would produce in the beehive oven a firm, coherent, ringing coke of fair character and strong enough to bear a furnace burden of 60 or 80 feet.

Coke works have been successfully operated during all the years covered by this report. Slack both from the Bloss bed (Upper Kittanning) and the Seymour bed, which lies some 150 feet above the Bloss, is used. The Seymour bed is 3 to 3½ feet thick. The coal is semi-bituminous, bright and shining, but very tender, carrying nu-

merous thin partings of iron pyrites and a large amount of mineral charcoal. The Bloss coal is freer from sulphur than the Seymour. It is very tender and easily broken into irregular, cubical pieces. It is in three benches. The middle bench sticks to the bone coal beneath so closely "that it is necessary to allow the miner to send the latter out, and it is taken out and cleaned at the shutes. This is done on screens over which the coal passes, and more or less of this bone is broken up in the operation and falls in among the fine coal. It is from the fine coal that coke is now being made. This will explain why the coke from No. 2 drift, or Bloss vein, shows so much impurity in the form of small pieces of slate and bone. This is now taken out by washing."

The following are analyses of the Bloss and Seymour coals and cokes from different mines in various parts of the field:

	Bloss.				Seymour.	
	Upper bench.	Middle bench.	Lower bench.	Run of mine.	?	
Fixed carbon.....	71.097	64.395	63.428	71.347	69.655	71.574
Volatiles matter.....	20.755	30.640	36.570	29.240	30.240	21.586
Ash.....	5.335	13.200	16.070	5.105	7.065	4.753
Sulphur.....	1.023	0.914	0.602	0.548	0.872	0.907
Water.....	1.190	0.940	1.110	2.260	0.911	1.180
Total.....	100.000	100.000	100.000	100.000	99.977	99.900

	Bloss.					Seymour.	
	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 1.	No. 2.
Fixed carbon.....	83.371	83.922	83.579	80.327	85.073	84.760	90.650
Volatiles matter.....	0.845	0.572	0.750	1.732	0.838	0.722	0.625
Ash.....	14.550	14.387	15.105	15.427	13.288	13.345	7.655
Sulphur.....	0.644	0.679	0.586	0.764	0.779	0.398	0.850
Water.....	0.590	0.240	0.080	1.150	0.022	0.175	0.230
Total.....	100.000	100.000	100.000	100.000	100.000	100.000	100.000

The coke is made chiefly to utilize the slack. This accounts for the much larger percentage of ash in the coke than in the coal. The following are the statistics of the manufacture of coke in the Blossburg district for the years from 1880 to 1884:

	1880.	1881.	1882.	1883.	1884.
Number of establishments.....	1	1	1	2	2
Ovens built.....	300	280	290	344	344
Ovens building.....	0	0	0	0	0
Coal used, short tons.....	72,520	88,055	100,119	71,028	62,365
Coke produced, short tons.....	44,836	56,085	61,726	44,690	39,643
Total value coke at ovens.....	\$134,500	\$168,250	\$163,740	\$122,450	\$98,763
Value coke at ovens, per ton.....	\$3.00	\$2.93	\$2.65	\$2.74	\$2.49
Yield of coal in coke, per cent.....	61	64	61	63	63

Total Coke Production in Pennsylvania.—Consolidating the statistics of the different districts of Pennsylvania given above, the

	1880.	1881.	1882.	1883.	1884.
Number of establishments.....	124	132	137	140	145
Ovens built.....	2,501	10,881	12,434	13,010	14,285
Ovens building.....	936	761	642	211	332
Coal used, short tons.....	4,347,558	5,363,503	6,149,179	6,823,375	6,304,604
Coke produced, short tons.....	2,821,384	3,437,708	3,945,034	4,498,464	3,822,128
Total value coke at ovens.....	\$5,355,942	\$6,988,579	\$6,133,698	\$5,110,387	\$4,783,390
Value coke at ovens, per ton.....	\$1.90	\$2.03	\$1.55	\$1.22	\$1.25
Yield of coal in coke, per cent.....	65	64	64	65	62

table herewith gives the statistics of the production of coke in Pennsylvania from 1880 to 1884.

The Heads of Wood Screws.

It may be questioned whether the present proportion of bevel or angle to the heads of wood screws is the best, and the proportion of diameter between head and shank is the best. A wood screw has a head that is twice the diameter of the shank, and its under side bevel presents a face that is two thirds the diameter of the shank or the original wire; thus: Diameter of shank, $\frac{1}{8}$ inch; head diameter, $\frac{1}{4}$ inch; bevel of head, $\frac{1}{8}$ inch. Thus the head is very flat or broad in comparison with the shank or size of the original wire from which the shank is formed.

Nails, which are driven into the wood and hold only by longitudinal friction, have very small heads—in finishing nails, hardly enough to redeem the nail's form from that of an elongated wedge. Screws hold by transverse projections—the thread—and certainly do not need any larger proportional head than do nails. All the heads of screws are "upset" in a heading machine; in some instances, as of short screws, the upset head absorbing one-third of the length of wire cut for the screw. This great spreading, of course, weakens the tenacity of the metal and tends to "broom" it out. To this weakness, inherent in the unfinished blank, is to be added the slotting of the head for the bit or blade of the screw-driver. This cut, always of a generous width, extends in depth almost to the bottom of the beveled head (more than half-way, making the head weaker as it goes downward, because of the decreasing diameter of the head), in effect nearly splitting the head in two. There are

faults in the present construction of wood screws that are apparent on consideration. Suppose that the proportions of the screw were changed, so that the diameter of the head should be less and its bevel more. For instance, take the foregoing size of screw: Shank, $\frac{1}{8}$ inch; diameter of head, $\frac{1}{4}$ inch; bevel of head, $\frac{1}{8}$ inch. This would make a head smaller in extreme diameter, but twice as deep, as the present style, while the head would be stronger, because it was less upset from the original wire size, but the screw-driver cut need not be any deeper. The long slant of the bevel of the head would obviate the necessity of a countersink except in very hard woods.

The Baltimore and Ohio Railroad. Apprentice School.

The opening of the Baltimore and Ohio Technical School for the training of its apprentices took place in January, 1885, and is consequently in a formative state; but as a development of a power already so wonderfully successful, its future as a power in the system of industrial training for the youth of this country is already assured. The system of apprenticeship, which in later years has fallen almost entirely into disuse, has never been abandoned by the Baltimore and Ohio Co. At the beginning of the present year the apprentices in the service of the company numbered 500 boys, 150 of whom were employed in the shops of the company at Mount Clare, near Baltimore. The Technical School, although forming a part of the original plan of Mr. John W. Garrett, owes its actual organization to his son and successor, Mr. Robert Garrett, who is a zealous advocate of industrial and technical training for the working classes of this country, as furnishing a powerful means of increasing their material prosperity and happiness. The object of the school is to promote the higher literary and technical education of the apprentices, with a view to their occupying positions of trust and responsibility in the service of the company, as foremen of shops, engineers, draftsmen, &c. In January of the present year, in pursuance of this object, and

according to ability and intelligence, into three classes, and are paid at the following rates per day for their services:

Year.	First class.	Second class.	Third class.
First.....	\$0.70	\$1.00	\$1.50
Second.....	80	1.12½	1.75
Third.....	90	1.25	2.00
Fourth.....	1.00	—	—

As an incentive to efficiency, industry and the care of its property the company will give to each of its apprentices at the completion of a full course, whose record has been satisfactory and praiseworthy, a sum equal to 8½ cents per day for each full day they serve in the first class, and 12½ cents for each full day in the second class. A pupil of the first class would thus receive \$10.40 if no days were lost, and in the second class \$17.36. Students who are admitted outside of the service, while under the same pay from the company as the other apprentices, are charged full tuition for instruction in the technological schools. Sons of wealthy men have already made application for admission, as the benefits of a system of technical education, which combines the best theoretical instruction with a shop practice in the magnificently appointed shops of the Baltimore and Ohio Co., where all that is newest and best in mechanical appliances is always in use, is readily seen and appreciated. On the completion of their full course the apprentices will receive diplomas which will entitle them to the preference over all other applicants for positions of responsibility in the gift of the company. The apprentices are also required to become members of the relief association, and are entitled to all the benefits of its savings fund.

On February 1, 1885, the school took possession of the large and handsome building which had been erected expressly for its use, and the first session began with the 40 students who had passed the required examination. The classrooms are spacious and well arranged, with a large drawing-room provided with raised desks and brilliantly lighted by numerous and easily-adjusted gas jets, and surrounded by blackboards for the illustration by the teacher of the principles of mechanical and free hand drawing. The principal sessions of the school are held in the evening, as the day is devoted to work in the shops, where practical instruction is given by Mr. Scribner. The school contains a large circulating library and reading-room, supplied with the best and newest literature of the day, and particularly rich in scientific books and journals, the most recent works on steam and steam engines, the lives and works of inventors, &c. One feature of the library is particularly worthy of mention. By means of library committees, appointed at all the principal stations, any apprentice on the line of the road can, by selecting a book from the catalogue, have it sent and returned free of charge. He can also obtain the necessary books and apparatus for following the course of the technological school. Thus the benefits of this excellent library are shared by the apprentices all along the vast line of the Baltimore and Ohio Railroad. Children of employees living in districts remote from the public schools are passed free over the road to the nearest school. The fine physical and chemical laboratory which was established for the use of the employees is also of great service to the students. Here they are taught to test the lubricating and other qualities of oils, to analyze the different metals which enter into the construction of engines and machines, as well as the analysis of the water used in engines and for domestic purposes along the line of the road. The literary training of the apprentices is in charge of Mr. Coles, a practical machinist, and thoroughly acquainted with the best methods of similar schools in Europe. In view of the necessity of postponing for the present the whole programme of the technological school, only such literary training is attempted as has a direct bearing upon the shopwork, which now includes the common English branches—algebra, geometry and elementary physics. Considerable progress has been made in free-hand and mechanical drawing.

The special feature of the Baltimore and Ohio Technological School consists in the fact that an instructor accompanies the boys into the shop and instructs them when at work. It is claimed at Mount Clare that this is not done in any other school of technology. The technological instructor exercises a general supervision over all the apprentices in the shop. He sees that they are kept at such work as he directs, and that they do their work in such a way as will tend to make them skillful and efficient workmen. Having assigned a boy to a particular shop, he there performs his work under the joint direction of the instructor and foreman. The instructor has authority from the general manager to talk with any boys at work in the shops about their work, to question them in order to see how well they understand what they are doing, to make explanations, and to direct their operations in such a way as to enable the apprentices to gain a comprehensive knowledge of the nature and principles of their work. For this purpose Mr. Scribner spends six hours daily in the shops and two hours in the drawing-room. A certain number of hours are set aside in which an instructor assembles the apprentices for the purpose of explaining and illustrating the scientific principles that are involved in the work on which they are actually engaged, or in suggesting the most economical methods of work, showing how the different parts of machinery are put together, and pointing out the office of each part. He also gives instruction in the use and care of tools and machinery and the nature of the materials used. The boys are at present trained as machinists, brass finishers, carpenters, steam and gas pipe fitters, molders, upholsterers, draftsmen, painters, bridge-builders and engineers.

The superintendent of the Naval Observatory says that institution has become one of the most important astronomical centers in the world. A new site was purchased for the plant of the observatory in 18

The Iron Age

AND

Metallurgical Review.

New York, Thursday, December 3, 1885.

DAVID WILLIAMS, Publisher and Proprietor.
JAMES C. BAYLES, Editor.
JOHN S. KING, Business Manager.
CHAS. KIRCHHOFF, Jr., Associate Editor.

RATES OF SUBSCRIPTION, INCLUDING POSTAGE.

THE UNITED STATES, BRITISH AMERICA AND SANDWICH ISLANDS.

Weekly Edition.....\$4.50 a year.
Issued every THURSDAY MORNING.
Semi-Monthly Edition.....\$2.30 a year.
Issued the FIRST and THIRD THURSDAYS of every month.
Monthly Edition.....\$1.15 a year.
Issued the FIRST THURSDAY of every month.

TO ALL OTHER COUNTRIES.

PER ANNUM, POSTPAID.
Weekly Edition: \$5.00—£1.25 francs—20 marks—12 florins—6 roubles (coin)—25 lire—20 pesetas.
Semi-Monthly Edition: \$2.50—10/-—12½ francs—10 marks—6 florins—3 roubles (coin)—12½ lire—10 pesetas.
Monthly Edition: \$1.25—5/-—6¼ francs—5 marks—14 florins—3 roubles (coin)—6¼ lire—5 pesetas.

REMITTANCES

should be made by draft, payable to the order of David Williams on any banking house in the United States or Europe; or, when a draft cannot be obtained in postage stamps of any country.

NEWSDEALERS OR BOOKSELLERS

In any part of the world may obtain *The Iron Age* through the American News Company, New York, U. S. A.; the International News Company, New York, U. S. A.; and London, England; or the San Francisco News Company, San Francisco, Cal., U. S. A.

RATES OF ADVERTISING.

One square (12 lines, one inch), one insertion, \$2.50; one month, \$7.50; three months, \$15.00; six months, \$25.00; one year, \$40.00; payable in advance.

BRITISH AGENCY.

Office of THE IRONMONGER, 42 Cannon St., London.

DAVID WILLIAMS, Publisher,
83 Reade Street, New York.

PITTSBURGH.....77 Fourth Avenue.
JOS. D. WEEKS, Manager and Associate Editor.

PHILADELPHIA.....220 South Fourth Street.
THOS. HOBSON, Manager.

CHICAGO.....36 and 38 Clark St., cor. Lake.
J. K. HANES, Manager.

CINCINNATI.....15 West Third Street.
HENRY SMITH, Manager.

CHATTANOOGA.....Ninth and Carter Streets.
S. R. LOWE, Manager.

SOLE AMERICAN AGENCY FOR

THE IRONMONGER.

Published at 42 Cannon St., London.

The oldest and leading representative of the British Iron and Hardware Trades.

Subscription, Postpaid.....\$5.00

to countries outside of Great Britain, including Monthly Foreign Supplement and one copy of the Ironmonger's Diary.

By a mutual clubbing arrangement between the two journals, subscriptions to both will be received by either *The Ironmonger* or *The Iron Age* on the following terms:

THE IRONMONGER and THE IRON AGE, Weekly

In the United States and Canada.....\$7.50 or £1.10

In Great Britain and Ireland.....5.50 or 1.25

In other countries.....8.00 or 1.15

THE IRONMONGER, Weekly, and THE IRON AGE, Monthly.

In the United States and Canada.....\$6.75 or £1.00

In Great Britain and Ireland.....5.25 or 1.10

In other countries.....5.75 or 1.15

Tariff Action in the Coming Congress.

All indications justify the belief that the coming session of Congress, in its relation to the tariff question, will be the most important that has convened for years. The discussions that have preceded its meeting have involved to a larger degree than usual the principles underlying the tariff and the lines upon which it should be constructed. While certain industries have not failed to advance their views as to what should be the duties upon the materials which they produce, the discussion has chiefly been upon general questions, such as the advisability of any reduction at the present time in view of the condition of industry; the great importance of stability of our tariff legislation; specific as against *valorem* duties, &c. The interest taken in these questions is evidenced by the greater activity of tariff organizations of long standing, the reviving and reforming of organizations that have done excellent work in the past, such as the Industrial League, and the formation of entirely new organizations not connected with any particular industry, and whose work is to stimulate a discussion of the general question, such as the free-trade organization lately formed in Chicago and the association of protectionists formed some months since in New York City. And yet it is evident that, notwithstanding the discussion has been upon principles, an attempt will be made in the coming Congress to reduce the duties on imports. Two views seem to prevail in the dominant party in the House of Representatives—one, that of the radical tariff reformers, of whom Morrison and Carlisle may be taken as types; the other, that of the moderate protectionists, of whose views Mr. Randall may be regarded as the exponent. The probabilities are that in this contest within the party the views of Mr. Randall will ultimately prevail. They seem to be in accord with the views of the President and

the Secretary of the Treasury, so far as they are understood. Indeed, a revision in accordance with these views is the only one that has any prospect of succeeding in the House or in the Senate. Mr. Morrison, with his horizontal views, has had several opportunities in recent Congresses to secure a vote, and in every case has been defeated, even though the majority in the House was of his own party, and though attempts have been made to make bills presented by him caucus and party measures. The best-informed Washington correspondents, writing for papers whose views incline to tariff reform, hold the belief that the only prospect of securing any tariff revision is through Mr. Randall.

If this view of the situation is correct, it becomes important to know what Mr. Randall advocates in connection with iron and steel. What may be his determination in this regard at the present moment, he is altogether too shrewd and wise a politician to make public. And yet there are indications from his past action that justify us in reaching a conclusion as to what the probabilities are. It will be remembered that in his speech at Louisville, at the time of his trip through the South, he assumed the position that a tariff for protection simply was not Constitutional, but that a tariff for revenue with incidental protection was. Now, this will lead to the belief that any measures that he may propose will not be for protection, but primarily for revenue, seeking so to adjust the duties on various articles as to give incidental protection. What he means by this can be inferred from his action in previous years, when his party has controlled the House of Representatives. This has always been in the line of a compromise between the view of the revenue reformers, or, as they were then called, the "free traders," and those of manufacturers and workmen. It is fair to presume that on many articles in the iron schedules Mr. Randall would propose reductions. We think it will be found, for example, that any tariff act that would meet the approval of Mr. Morrison would provide for material reductions in the duty on steel rails, say to ½ cent a pound, or possibly \$11 a ton. The steel-rail manufacturers would consent to no modification of the duty, which is now \$17, and it would not be surprising if the proposal that will finally come before the House should be a compromise between these two rates, \$14. This would please the South and West. But, on the other hand, a reduction of the duties on ore and pig iron would please neither of these sections, so that any reduction in the duties on these two articles will probably not be as decided as on steel rails.

There is another matter that must not be overlooked in considering the probabilities of Congressional action the coming session. In a recent report from the Bureau of Statistics of the Treasury Department there appeared a classification of imports based chiefly on their assumed progress in the process of manufacture. This division into five classes is stated by the chief of the bureau to have been suggested by prominent economists who had made the subject of the tariff a careful study. It is evident from some parts of the classification that it was the work of closet economists, or theorists, and not to any great extent of men who are practically engaged in production or distribution of goods. These five classes are as follows:

- Articles of food and live animals.
- Articles in a crude condition which enter into the various processes of domestic industry.
- Articles wholly or partially manufactured for use as materials in the manufacturing and mechanic arts.
- Articles manufactured ready for consumption.
- Articles of voluntary use, luxuries, &c.

We suspect that this classification has been made with a view possibly to reductions in duties, varying not with specific articles, but with the categories into which they are classified. For example, under Class B the articles include four classes of iron and its products—iron ore, pig iron, scrap iron and steel in bars, blooms, billets, &c. Now, there is evidently a design in this, for no person who at all understands the processes of manufacture would think of classifying steel in bars in the same category, so far as advancement in the process of manufacture is concerned, as iron ore and pig iron, while to add to the absurdity of the classification the blooms and loops which enter into the manufacture of this same steel are to be put in Class C. We imagine that this classification by prominent economists will play an important part in the tariff legislation of the next Congress.

We conclude, therefore, that a decided effort will be made in the coming Congress to revise the tariff in the line of reduction of duties; that two views will be found to obtain among the members of the dominant party in the House of Representatives, one demanding marked reductions, and the other a compromise between the present law and the views held by the protectionists and the views of these radical revenue reformers; that Mr. Randall will be found with the party of compromise, and probably the President and the Secretary of the Treasury will hold views similar to those of the Pennsylvania Representative; and we believe also it will be found that the chief obstacle to the prevalence of Mr. Randall's views will be the jealousy of him that will exist in

certain directions, in view of his prominence as a Presidential candidate in 1888, and this, as much as anything, will defeat the attempt at tariff revision in the coming Congress. Moreover, concurrent action by the Senate and House is improbable, and, on the whole, we believe that the chances of any House bill becoming a law are extremely small. We may, however, expect that the mischievous results of protracted discussion will be as severely felt as if the probabilities were in favor of concurrent action between the House and Senate.

The Quality of Rails.

In last week's issue of *The Iron Age* we alluded to the reports then in circulation that the Chicago, Burlington and Quincy Railroad had purchased steel rails in Great Britain. One of the English trade papers, just at hand, notes the matter, stating that the Barrow Hematite Co. had obtained a contract for 10,000 tons, stating at the same time in substance that the exceptionally good quality of the English rails had made the business possible in spite of a heavy protective tariff. Whether this is the identical lot purchased by the Chicago, Burlington and Quincy Railroad is not clear, because it is known that Mr. Vanderbilt has bought a lot of about 10,000 tons for those parts of his system which are located in Canada. It is certain, however, that the first-named railroad has contracted for the delivery in 1886 of 10,000 tons of English rails. The lowest figure at which the business is reported to have been done is \$45—that is to say, the railroad managers have seen fit to make an outlay of not less than \$100,000 additional for some object not yet clearly defined. We know that a number of rail-mill managers have during the past year frankly acknowledged that they have had trouble with some of their customers, growing out of rapid wear of rails in service, and derogatory remarks concerning the quality of the product of rival mills are frequent and sweeping enough to cast doubts upon the make of nearly every active works in the country, if they did not come from interested sources. We have before, in discussing this subject, pointed out that there are many factors entering into the settlement of questions at issue which modify bald statements reflecting upon the quality of American rails. But it would be idle to deny, and we do not believe that the best friends of the industry will deny, that at the bottom of it all there has been something radically wrong. Let it be assumed that our rails have been uniformly made of as high a quality as was possible. Then the conclusion cannot be escaped that either the rail manufacturers have not been willing to meet fair demands or that the railroads have drawn up unreasonable specifications. Whether it be justified or not, it is certainly an unfortunate state of affairs when the relations between seller and buyer become such that the latter is willing at a heavy pecuniary sacrifice to look to other than his natural markets for supplies. It is an act which strongly resembles an appeal to arms on the part of nations unable to reach an adjustment of pending difficulties by peaceable means. The moral effect of such a step upon the public at large is one which must be seriously considered. Our rail-makers may assert with the utmost vehemence that they are capable of and willing to produce as good an article at a lower price. Those acquainted with our steel industry know that they can, and yet that would not convince those who are hostile to our great industry and who couple that hostility with the most distressing ignorance of its capacity to do excellent work. Argument or proof could not shake them, and yet their voice is not without some unfavorable influence. Under the circumstances it behooves the American rail manufacturers to take steps to thoroughly inquire into this subject, to exhaust every means of preventing the spread among railroad managers of the notion that it might be true economy on their part to buy foreign rails at a high price under the mistaken idea that they cannot get as good a product at home, because American producers cannot or will not turn out the very best when it is wanted. We speak thus advisedly because we know that the leading official of one of the greatest trunk-line systems of the country claims to have found by close observation, under directly comparable conditions, that to use his words, "American rails laid side by side with English rails are wearing one-third faster." That may or may not be a fact. It suffices that the president in question has reached that conclusion, rightly or wrongly, to lead to action on his part which we may have reason to deplore when it is too late. We may add that while we write negotiations are pending for another lot of 5000 tons of English rails for an American road.

Unfortunately, it is only too true that to some extent poor work has been turned out. We are far from accepting as correct any but a few of the many statements concerning failure in track which have been current of late. We insist again that much that looks like evidence of the use of inferior materials or of poor workmanship on the part of American rail-makers is really due partly to faulty specifications or excessive service. We know that rail buyers have erred alike in demanding too mild or too hard a steel. We know that the weight of rails and the character of the fastenings has not kept pace with the increased weight of locomotives and rolling stock and with the

greater strain due to higher speed. We repeat our accusation that during the long period of depression a good many American railroads have allowed their permanent way to get into a pretty bad condition. We know of one instance where a road actually went over its pile of old iron rails and fished out the best of them to replace worn steel rails because they did not have the money to buy new ones. We know of another road which bought iron rails. And yet, eliminating all these factors, a residuum remains purely and solely chargeable to bad materials and bad work. Let it be conceded that the necessity of reducing losses to a minimum may be a justification for the fact, and that the end of the long strife, with its better conditions for the manufacturers, will prevent its recurrence. That does not change the situation. Those who have been guilty of preferring to do poor work at a loss rather than to decline to meet the market are only now beginning to reap the harvest. It so happens that the results are only coming out now. It will make the reputation of some concerns and mar that of others, and we may hear more in the future of favorite brands than we have in the past. The lesson is one that is dearly bought, but it is to be hoped that it will be heeded.

Some members of the Board of Control of the Rail Manufacturers Association are reported to be strongly in favor of acquiring larger powers. We know of no better outlet for any surplus energy they may possess than the labor of going to the bottom of the matter, either themselves or through a mixed board of railroad and metallurgical experts.

Cast Steel Ordnance.

The visits of the Congressional Ordnance Committees to our great iron and steel producing centers gives additional interest to a series of trials made in Sweden. It is well known, and the fact has been dwelt upon in the report of the Gun Foundry Board, that one of the heaviest sources of expense in fitting up a plant for manufacturing ordnance is the forge or the press, the latter being recommended by the board. If it could be satisfactorily shown that the forge or press can be dispensed with, and metal simply cast could be substituted for it, a very important economy in first cost of plant and in manufacture would be realized. It is well known that the Terre Noire company have for years been manufacturing considerable quantities of projectiles for the French Government by casting steel under the process so well described in the *Metallurgical Review* by the late Mr. A. L. Holley, and that the same system is used there for some parts of ordnance. But it has remained for Swedish works to apply the Terre Noire solid steel casting process to the manufacture of ordnance. Capt. Franz Holzner, of the Austrian army, has given to the public the details of the manufacture at the Bofors-Gullspang Works, Sweden, and M. Euverte has called attention before the Société de l'Industrie Minière to a translation of the paper ordered to be printed by the French Government.

The Bofors Works have adopted the Terre Noire process, and, with the encouragement of the Swedish Government, began to experiment with producing cast steel of such quality and so homogeneous that it could be used directly for making gun tubes without the intervention of any forging or hydraulic compression. Their charge in the open-hearth furnace consisted of 26 per cent. of pig made from picked ores, 6 per cent. of a white pig containing 12 per cent. of manganese, 63 per cent. of scrap from working the purest Swedish iron produced by the "Lancashire" process, and 5 per cent. of Terre Noire special pig, which, it will be remembered, is an alloy of iron, manganese and silicon. The gun-tube ingot and the jacket are both cast in iron ingots, the former being cast with the muzzle up and with a large head, and the latter in the reverse position. Thus far the question whether guns upward of 15 centimeter caliber can be cast hollow, to save waste of metal and to economize in labor and in time, has not yet been approached. The crude casting, while it possesses fair mechanical qualities, must undergo further treatment. This consists of heating the cast ingot and covering it with charcoal dust, allowing it to cool thus enveloped. The ingot is then turned and drilled and is reheated and tempered in oil. Finally, it is subjected to a moderate reheating and is then ready for the final tooling. This steel with 0.37 carbon showed an elastic limit of 31,719 pounds per square inch, a tensile strength of 87,335 pounds, an elongation in 3.94 inches of 13 per cent., and a reduction of area of 14.4 per cent.

At the Finspong Works of the Swedish Navy it is customary to test 4-pound trial guns, smooth bore, from every lot of metal used for making heavy cast-iron ordnance, and for comparison with the large number of data thus accumulated it was determined to try first a solid steel gun of the same size. It has a 3.29 inch bore, is 57.44 inches long and weighs 1.1 metric tons. This little cannon was fired 322 times with a bursting charge, while the best cast-iron guns had resisted only 219 shots. Then the system was changed. After the powder had been introduced the gun was loaded to the muzzle with round shot. It was placed in a horizontal position, so that the last ball, protruding from the muzzle, rested against

a block of cast iron weighing 1.2 tons. Then it was fired, and sometimes the strange spectacle was seen of a gun flying through the air. At the tenth shot fired in this way the gun burst into four pieces.

These results were considered so encouraging that an 11.7 c. m. breech-loading rifled siege gun was cast. The steel for the gun castings was rather mild, two tests of different parts of the gun showing 0.30 and 0.25 carbon. The former had an elastic limit of 33,568 pounds per square inch, the latter 42,672; the tensile strength was 77,663 and 81,788 pounds, respectively, and the elongation, 23.5 and 21.5 per cent. Although the grain of the powder used in the trials was somewhat too small for a 12 c. m. gun, and the pressures varied considerably, the gun acted very well under hard service.

The results thus far obtained are considered very satisfactory, and hold out good promise for the future. Even should it be found that for the largest sizes some method of mechanical working is necessary, which *a priori* reasoning does not encourage, there would be a wide range of usefulness for smaller ordnance. The subject is one in which a deep interest will be taken by American ironmasters, especially as some of them have had considerable experience with the Terre Noire method of solid steel casting.

Our Trade with Spain and Her Colonies.

Our trade with Spain and her three principal colonies, taken together, is next in importance to the trade we carry on with England and Germany; anything, therefore, which intimately affects these countries cannot be altogether indifferent to us. The death of King Alfonso, who is succeeded by his infant daughter, under the regency of her mother, may lead to great changes in Spain, and consequently in her colonies, though no immediate danger of revolution is anticipated. A new Cabinet, under the leadership of Sagasta, has been formed from the Liberal party, and the best elements of that party compose it—men of acknowledged talent and integrity, who will not be likely to swerve from their duty to the country in the present crisis. A strong supporter of the Alfonsist dynasty, Martinez Campos, the most popular general in Spain, and the man who brought the Cuban insurrection to a close, is at the head of the army. As the Liberal party was in the ascendancy in Spain, it was evidently a good stroke of policy to identify them at once with the new order of things and select men to manage affairs known to be both loyal and able. The forces that many fear may conspire to upset the dynasty are, on the one hand, Don Carlos, now living in Venice, and his adherents, who pretend to have a superior hold on the Church and the Basque Provinces, and on the other Zorilla and the radical Republicans. Both these elements are reputed to be formidable taken by themselves, but in reality, representing two extremes, they hold each other in check. The accession to power of the Liberals appears a suitable compromise between them, and having a hold on the numerous middle classes the new administration may prolong its sway indefinitely, provided the chief generals, and with them the army and navy, remain steadfast in their support, about which there seems to be no apprehension. Spain since the last Carlist rebellion has been steadily recovering in prosperity. The vintage has become one of the chief resources. Since France suffered so terribly from the phylloxera Spain has become a great exporter of wines, chiefly to France. But her mineral resources have developed almost on a par with viticulture. A large export has been carried on in iron ore, calamine, quicksilver, copper and lead, in most of which Spain now ranks next to this country, and so far as copper is concerned, to Chili. Spain is at present the richest mineral country in Europe, if we except England. There are also many other important articles in which the Peninsula excels and is capable of great increase, as fruits, corkwood, silk, saffron, &c. The three colonies—Cuba, Porto Rico and the Philippine Islands—will collectively produce in 1885-86 something like 1,300,000 tons of cane sugar, now once more a paying branch of agriculture, not to speak of the 400,000 cwt. of Havana Vuelta Abajo tobacco, the quality of which has vastly improved, the huge cigar manufacture at Havana, the coffee and tobacco of Porto Rico and Manila, and the reviving iron and copper mining in Cuba.

Public indebtedness is, it is true, very large in Spain—about \$2,200,000,000 of our money—and Cuba also owes \$250,000,000, but the debts of both are fully under control, Spain paying interest regularly for years past, and powerful syndicates of bankers on the Continent being ready to consolidate the Cuban debt on a fair basis, besides furnishing the necessary funds to build the Great Central Railroad of Cuba of some 500 miles in length. Porto Rico has for a year or two past suffered from low prices for her products, but this has been the case in all tropical countries, the Philippine Islands included, otherwise both these colonies may be called prosperous. In the latter hemp culture and tobacco growing have become more and more important. In spite of earthquakes and the cholera in Spain and the tribulations arising from the Caroline Island dispute there has been a steady march onward, and this will no doubt continue if the political situation be allowed to take its

course quietly. The reciprocity treaty between the United States and Spain was abrogated in July last, and only the treaty relating to Cuba of February, 1884, remains in force. Meanwhile our trade with Spain and the colonies has been as follows:

Fiscal Year, 1885.		
Countries.	Import to the U. S.	Domes. exp. from the U. S.
Spain.....	\$4,708,945	\$11,967,185
Cuba.....	42,346,063	5,719,108
Porto Rico.....	6,104,263	1,533,177
Philippine Islands.....	7,789,750	169,354
Central, Canary Islands and Fernando Po.....	127,866	151,115
Total.....	\$61,081,429	\$22,540,006
1884.		
Spain.....	\$6,297,530	\$11,890,033
Cuba.....	57,181,497	10,562,880
Porto Rico.....	6,890,456	2,188,609
Philippine Islands.....	12,329,531	194,925
Central, Canary Islands and Fernando Po.....	113,672	72,054
Total.....	\$82,722,676	\$24,908,491
1883.		
Spain.....	\$7,794,345	\$16,815,708
Cuba.....	65,544,534	14,567,918
Porto Rico.....	5,477,493	2,116,499
Philippine Islands.....	10,076,117	128,534
Central, Canary Islands and Fernando Po.....	541,446	187,108
Total.....	\$89,433,935	\$33,816,067
Total trade, \$123,360,002.		

The decline in the total trade of \$39,678,753 has been due to the depreciation in the value of colonial produce and some decrease in our export of cotton to Barcelona, as well as the low price of petroleum, of which Spain receives a considerable amount of crude. Of cotton Barcelona takes between 200,000 and 300,000 bales this year. Thus during the first week of November there were landed at Barcelona direct from this country 18,500 bales of cotton. The average total trade we have been carrying on with Spain and her colonies during the last three fiscal years has, it will be seen, been \$104,817,533, an average which in good times may easily be kept up or even exceeded.

The New Patent Law of Norway.

The Patent Office has printed a translation of the new patent law of Norway, which was passed by the Storting and approved by King Oscar last June. An examination of its provisions is very interesting to American lawyers and inventors as a comparison with the policy of our own law on that subject. In substance and in its general provisions the statute is very similar to ours, but there is considerable difference in the matter of detail. For instance, there can be no patent for foods, beverages or medicines. The patent medicine is an impossibility in Norway. Not that this would prevent the patenting of a process of making such medicine, but the medicine itself is unpatentable. As to the question of novelty the law is much stricter than the American practice. The invention is not new if known before the application for the patent is handed in so well as to enable competent or skilled persons to put the invention in practice. Only six months' time is allowed after a description of the invention has appeared, or an ordinary exhibition of it made, to file the application. The limit in this country is two years. On this point we think our law much superior. The tendency is already strongly marked even in the United States to regard the inventor as a would-be monopolist, who should be held to the strictest letter of the law, and to discriminate against him in favor of the public. His rights are often lost by slight technical omissions, and he is deprived of the benefits of his labor and genius. A long period of time is often absolutely necessary before an inventor can mature and perfect his invention. It would seem, therefore, that six months would be a very limited period, and apt to work much injury and injustice.

Another difference of policy in the Norwegian law is the system of taxing the invention each succeeding year with a fee which increases in an arithmetical ratio. The duration of a patent is 15 years. The fees for obtaining the patent are 30 kroner, and an annual charge is made of 5 kroner the second year, 10 the third, 15 the fourth, and so on to the expiration of the 15th year, making in all 555 kroner. It is difficult to perceive the object of this tax unless it be to increase the revenue of the Patent Office or of the Government. Such a system put into operation in the United States would yield an enormous annual income to the Government. But it would hardly be wise for us to adopt such a policy (as it is needless to say) in this country, and in a country of the limited industrial development of Norway it seems almost suicidal. To be sure the amount is relatively small, but any restriction of this kind is a check on the inventive genius of the people. It is true that if an invention is successful it could easily submit to a slight taxation. But inventors, as a rule, are not men of means, and the law might compel many of them to part with their rights at much less than the real value of the invention, or deter them from the labor of inventing and perfecting it.

Patented inventions, moreover, are subject, so far as the monopoly of them is concerned, to the right of the King or the Government to take them for the public benefit whenever he or they deem it necessary or advisable. This may be done without the consent of the patentee. The question is suggested whether our own Government without such an express provision would have such a right. We know of no case where this has ever been done, but it is easy to imagine that such an emergency might

arise, as, for instance, in time of war, when the Government might be in need of some patented article which the inventor refused to part with except upon exorbitant terms. Could the Executive manufacture the article so as to infringe upon the patent? We think he could in the exercise of the right of eminent domain. The Government has the inherent right to take private property for public uses, though, of course, it would be obliged to make adequate compensation to the patentee. A patent is a species of property, and would fall under the rule. Under the Norwegian law the King can delegate this right to private individuals or corporations when the public good demands it, in the same manner as a railroad company in this country may take land by such delegated authority. This would seem to be a dangerous rule, and liable to abuse unless carefully limited.

Another provision of the law is that after obtaining the patent the inventor must manufacture and "work" his invention or offer the article for sale within three years. This is a very salutary rule, and if adopted in the United States would prevent many evils which grow up under our present system. Every one knows that patents are often taken out without any intention of manufacturing or selling the article, but merely for the purpose of harassing other inventors. Sometimes the patentee will remain quiet for years, and then suddenly pounce down on every manufacturer or purchaser of the article and levy a kind of legalized blackmail on the community. Such a provision would effectually put a stop to such disgraceful practices. That part of the Norwegian law which possesses most interest for the American inventor is the sections which treat of foreign patents. Foreign patentees are allowed to take out a patent in Norway for their inventions provided reciprocal rights are granted to Norwegians by the law of the country of which the foreign patentee is a citizen. The application must be handed in within seven months after the application in the inventor's own country, otherwise the patent will be refused. The patent will not be granted directly to the foreign inventor, but he must be represented by a deputy resident in Norway who can be summoned on the patentee's account.

The substance of the report by Chief Engineer A. G. Menocal, U. S. N., on the relocation of the Nicaragua Canal has been published. It is claimed that it is based upon a careful instrumental location of the entire line, which has led to changes virtually making it an entirely new project. The Nicaragua Canal route is characterized first by the possibility of utilizing the open navigation of the Nicaragua Lake and of the San Francisco and San Juan rivers. On the other hand, the chief drawback in the estimation of many is the absolute necessity of a number of locks, the summit level being 110 feet above mean tide. Beginning at Graytown, on the Atlantic Ocean, the projected canal, after three locks in 22.4 miles, reaches the Rio San Juan, on which, with the aid of a 52 foot dam, there is navigation for 64.54 miles to the lake, through which the route lies for 56.5 miles. The western division, with the aid of four locks, carries the canal down, in a distance of 16.54 miles, to the level of the Pacific Ocean at Brito. Thus in a total length of 169.8 miles from ocean to ocean there are only 40.3 miles of canal proper, with the reduced number of seven locks. Mr. Menocal estimates that the total time of through transit will be only three hours, allowing 45 minutes for each lock and a speed of 5 miles an hour in the canal proper. On this basis he puts the yearly capacity at 20,000,000 tons. Including the harbors at Graytown and Brito, the improvement of lake and San Juan and San Francisco River navigation, the seven locks, the San Juan dam, Mr. Menocal places the total cost at \$51,234,950, and adding 25 per cent. for surveys, hospitals, management and contingencies at \$64,043,699. Considering that this would provide a passage 28 to 30 feet deep between the two oceans, this figure is certainly exceedingly small, and if his estimates are worthy of entire confidence Mr. Menocal's route may after all be pre-eminently the one offering the greatest inducements.

The Hon. Samuel J. Randall is credited with expressing an opinion recently which voices the feelings of many, though the conclusion he draws from it would hardly seem to be warranted. Mr. Randall, who is a member of the Congressional Ordnance Committee, points to the fact that the natural gas interests of Pittsburgh are in the hands of a monopoly which is too powerful to be overthrown. Let that be granted, and yet it does not follow that, if Mr. Randall has been correctly reported, natural gas will in time be more costly than coal, and that it would be unwise to recommend Pittsburgh either as the site for the national foundry or as the seat of supply for the large castings needed in the manufacture of great guns. No one will deny that the concentration of the natural gas supply of Pittsburgh in the hands of one set of men constitutes a danger to the iron manufacturers of that city, but these men do not control all the wells in the country, and rival manufacturing centers have been quick to provide themselves with the cheap fuel. The pipe lines may be longer and costlier, the supply may possibly be less ample and less constant, and the first cost of the fuel may therefore be heavier, but the existence of this competition places a limit to possible monopolist greed on the one hand, while cheap coal draws another boundary on the other. We fail to take so gloomy a view of the future as that attributed to Mr. Randall.

The striking Western nailers are talking a good deal of starting co-operative nail works, and in one or two instances their schemes seem likely to crystallize. One 60-machine

mill is to be started near St. Louis, and at Pittsburgh negotiations have been conducted with a similar end in view. To those who are acquainted with the prospects of the business of manufacturing nails under normal conditions it is almost incredible that the lessons of the earlier months of the year 1885 should be so entirely forgotten. Nails then went down to unprecedentedly low figures, simply because the supply was heavily in excess of the demand. So long as there is no stoppage East or West, due to a general strike, the capacity of the nail machines in the mills of the country is much greater than the prospective demand. It will probably take years and a readjustment of the seats of manufacture, territorially, before there is any real want for additional plant and equipment. Co-operative enterprises in this industry, therefore, have an unusually poor chance of success.

WASHINGTON NEWS.

(From Our Regular Correspondent.)

WASHINGTON, D. C., December 1, 1885.

The President will submit a final draft of his first annual message to Congress to the Cabinet on Thursday. The document is substantially finished, but is subject to such modifications as may occur between this and the meeting of Congress. It is possible that the whole of Monday next may be consumed in the election of a President *pro tem.* of the Senate and Speaker and officers of the House of Representatives. There is no opposition to Mr. Carlisle, but there may be considerable of a contest in the Senate, there being three candidates—Logan, Sherman and Edmunds. This struggle might continue for several days, depending entirely upon the disposition or indisposition of the friends of the various candidates to compromise in favor of one or the other.

There is no doubt that the chief features of the President's message to Congress will relate to silver, the tariff and civil service. In order to advise himself more thoroughly as to the tariff the President has availed himself of the information acquired by Assistant Secretary of the Treasury Fairchild from the replies to the circular of tariff inquiry. The details of this important subject were assigned by Secretary Manning to Mr. Fairchild, and under his supervision the information contained in the replies has been carefully collated and made available for department use and action. The information conveyed by the different industries has been very conscientiously examined, and will, from the conversation of those in authority, receive consideration with a view to such recommendatory action as will subserve the interests of the country, and not for the furtherance or encouragement of visionary and inimical theories of public economy.

The message of the President and the report of the Secretary of the Treasury will treat more upon the enforcement of the existing statutes than the recommendation of radical measures of revision. The most serious difficulty now is the imperfection of the administrative features of the law, and the utter impossibility of punishing fraud. Among the papers of the department are over 15,000 cases of undervaluations in which the Government has been unable to bring the guilty parties to punishment on account of the defects of the law growing out of the repeal of the moiety act. The measure, therefore, will urge vigorous legislation against undervaluations and false appraisements.

There will be no distinctive change of rates of duties recommended. There is a disposition, however, to indulge in some general reflections upon tariff adjustment and tariff revision. This sort of cant has become so common among straddling politicians that there is danger that the Administration may fall into a similar error. The good sense of the President and Secretary of the Treasury may prevail and put an estoppel on this sort of claptrap talk should there be a disposition to engage in it. From what is known in a general way of the message, it will be an exceptionally interesting and carefully considered and prepared document—not very lengthy, and yet comprehensive and satisfactory.

The Administration is largely pro-British in its economic antecedents. The President and Secretaries Manning and Whitney are the only conservative members on the tariff question. As Secretary Manning has said to the correspondent of *The Iron Age*, "When the Administration acts on that subject it will act together." In view of this and from what is known of the views of the President and Secretary Manning, the free-trade Members must have yielded some of their former radicalism on that question. The following may be stated generally as the views of the gentlemen composing the Administration: The President does not favor hasty action, and thinks that such a question as the tariff should be approached with extreme caution. The Secretary of State, Mr. Bayard, during his service in the Senate, always took the side of free trade, and during the contest over the Morrison bill made a speech at a banquet held to create sentiment in favor of that measure. The Secretary of the Treasury, Mr. Manning, is mindful of the interests of his own country first, and, while inclined to recognize the campaign platitudes of the party platform relating to tariff revision, he is conservatively inclined. The Secretary of War leans toward the New England "free raw material" cry of many of the leading Democrats of that section. The Secretary of the Navy, having had a large share of practical business experience, recognizes the necessity of extreme caution in legislating on economic questions, and particularly the tariff. The Secretary of the Interior has favored tariff for revenue only, the campaign cry of 1880 which helped so much to defeat Hancock. The Postmaster-General holds the Western Democratic idea of free trade as a supposed blessing to the farmer, to the exclusion of every other interest. The Attorney-General has decidedly free-trade leanings, on the plea that such doctrines are of advantage to any agricultural State.

TARIFF INQUIRY AND REVISION.

The replies received by Secretary Manning to his circular of tariff inquiry will afford curious reading for the enemies and sur-

prising information to the friends of American industry. The Secretary's good intentions have been considerably overdone by the differences which are manifest in the reports and letters which have been prepared for publication. They will compose a volume of 400 to 500 pages. It is also very doubtful whether the publication of such a diversity of views will serve to strengthen the cause. The replies in individual instances too often conflict with the position taken by the general industrial organizations representing the aggregate views of the same branch of industry. The free traders in Congress will take every opportunity to take advantage of any weak points in the replies.

As the Members of the House of Representatives arrive preparatory to the assembling of the first session of the Forty-ninth Congress, it becomes more and more settled that the subject of tariff revision will not only be one of agitation, but early after the Christmas holidays will take a tangible form in the introduction of four or five bills on the subject. Quite an influence has been brought to bear to prevent a reopening of the question, but this appears to be a waste of time, and the friends of industry are beginning to discover that the true policy is to face the music and drive the enemy from the field.

METALLURGICAL.

Charcoal and Coal as Blast-Furnace Fuels.

A thoughtful paper presenting some points in a new light has been contributed to *Stahl und Eisen* by E. Belani, of Hiefau, on the comparative value of charcoal and coke as blast-furnace fuels. The facts are, of course, generally known, but theoretical explanations of them have not before been furnished in so clear a manner. No one will disagree with Herr Belani when he puts forward as axioms that the calorific effect of a unit of fuel in a unit of time depends, first, upon the area exposed to the action of the blast, and, second, upon the affinity of the particular modification of carbon for oxygen. With the object of illustrating the points involved, Herr Belani chose soft fir charcoal as used in the Styrian charcoal furnaces, weighing 140 kg. per cubic meter, and Miroeschau, Bohemia, coke, weighing 420 kg. per cubic meter. Assuming both parts to consist of pieces of equal size, viz., spheres 70 mm. in diameter, 420 kg. of coke would possess a surface of 45 sq. m., while the same weight of charcoal would possess a surface of 135 sq. m. Herr Thörner has found that Styrian charcoal has a cell volume of 264 c. cm. per gram, while the average with coke is 50.2 c. cm. These figures Herr Belani adopts. Now, charcoal possesses the peculiarity that a large surface is added to it by fissures. Belani measured these fissures and found as an average of a large number of samples that the additional surface thus presented is equal to the surface of the pieces of charcoal themselves. With these data he has computed the following as a fair comparison of the surface presented to the blast by 100 kg. of coke and of charcoal:

	Coke.	Charcoal.
	Square meters.	Square meters.
Outer surface.....	10.7	32.1
Cell surface.....	24.1	126.7
Fissures.....	.....	32.1
Total.....	34.8	190.9

The surface of charcoal is therefore 5.5 times as great as that of coke.

The second point to be determined is the comparative facility of ignition, and that Belani attempted to ascertain by burning equal quantities of both fuels, in pieces of as nearly equal size as possible, in a shaft furnace, noting the time it took to consume both. In one case he found that the ratio was 1.4 to 1 in favor of charcoal; in a second, the average of three tests the ratio was 1.6 to 1. He adopts 1.5, and states that, while this is surprisingly small, it may be larger with different grades of coke. The product of the comparative surface development and of the facility of combustion may represent the relative value of the two fuels, the ratio being 1 to 8.25. It is evident that, since the surface of equal weights of the two fuels is incapable of any change, the only means available to approach them is to increase the rapidity of combustion of the coke. This means is afforded by the pressure of the blast. It is true that it is not definitely known that the rapidity of the combustion increases directly in the same ratio with the increase of the pressure of the blast, but indications point in that direction. Thus, if a 2-pound pressure is the maximum in Styrian furnaces, the same rapidity of combustion could be reached in a coke furnace only by blowing at 8.25 times the pressure, or 16.5 pounds, in order to make the consumption of fuel equal in both cases. Such a pressure is not practicable, and therefore another means is adopted, viz., the use of a greater quantity of the denser fuel, and this, Herr Belani urges, is the true reason why coke furnaces must consume more fuel than charcoal furnaces. Such an increase in the quantity of fuel used has two advantages. A greater surface is created for the attack of the blast, and the quantity of ore in the unit of space is diminished, thereby decreasing the calorific requirements. On an average the increase in the consumption of fuel in making mill iron of coke over charcoal is 40 per cent.—that is, for the same weight of charge, the surface of the coke is increased by 40 per cent. The surface exposure to blast was computed in the case of coke at 34.8 sq. m. per 100 kg., therefore, 140 kg. would have 48.72 sq. m., or the ratio to charcoal (with 190.9 sq. m. per 100 kg.) would be decreased from 1 to 5.5, as above, to 1 to 3.9. This would admit of a reduction of the blast pressure to 11.7 pounds and yet allow of producing the same rate of combustion as 100 kg. of charcoal would have with 2 pounds pressure.

If coke and charcoal could be made to work at the same rate of combustion, the charge per cubic meter would be:

	Charcoal.	Coke.
	Kg.	Kg.
Fuel.....	115	291
Stock.....	314	620

This shows a ratio of weight of stock per unit of space of 1 to 2. Now, by increasing

the fuel quantity by 40 per cent., the figures for cubic meter of volume would stand:

	Charcoal.	Coke.
	Kg.	Kg.
Fuel.....	115	291
Stock.....	314	550

The ratio of weight of stock has declined to 1 to 1.75, and for cubic meter of volume 70 kg. of stock have been taken off. The heat requirements are thereby reduced 25 per cent., and, as a slower rate of combustion is allowable, the pressure may be reduced from 11.7 to 8.78 pounds.

The pyrometric effect of coke is greater than that of charcoal, and, since it is a question of temperature, coke possesses certain advantages. The pyrometric effect of charcoal is 2104; that of coke 2774, or a ratio of 1 to 1.3; therefore a further reduction in the pressure from 8.78 to 6.18 may be made. In a coke furnace the materials lie more densely than they do in the charcoal furnace. For the charges given above the open space per cubic meter of charge is computed at 0.58 cubic meter for the charcoal furnace and 0.44 cubic meter for the coke furnace. This leads to high pressure in the latter, causing an elevation of temperature. The lower loss by radiation, referred to unit of cubical contents, is another fact which diminishes the necessity for a rapid rate of combustion, and causes a further diminution of pressure to the figures actually prevailing in practice.

While increase in pressure is one means of increasing the rate of combustion, heating of the blast is another one. If the usual higher pressure and the usual increase of surface by additional fuel combine to create in a coke furnace a rate of combustion equal to that in charcoal furnaces, then the addition of another factor operating in the same direction will allow of some reduction of the others. Thus the surface development may be reduced by taking off from the additional amount of fuel, added simply to carry the rate of combustion up to the standard of that of charcoal due to its peculiar structure. This Belani claims is the true reason for the saving of fuel due to the use of hot blast, and it explains, too, why the employment of hot blast tells more in fuel economy in the coke furnace than in charcoal furnaces. Charcoal, which has a high rate of combustion, even with cold blast, reaches its maximum even at lower temperatures, while with coke high heats only begin to develop an approach to the maximum rate of combustion. The inference to be drawn from Belani's line of reasoning is that the denser the fuel the greater will be the fuel economy through the use of high pressures and hotter blast, the more will the low consumption of the charcoal furnaces be approached. Belani undertakes to explain other phenomena on the same general theory. The most interesting question is that why the quality of the pig produced in the charcoal furnace is better than that of the coke furnace. He holds that it is due to the higher temperature at which the reduction proceeds, carrying more impurities into the iron in spite of the probable fact that in the coke furnace the pig iron goes through a partial fining process while passing the tuyeres.

The annual report of the Postmaster-General reviews at length the question of steamship mail subsidies, stating the conclusion that the rate of sea postage is abundant, that the transportation of mails is no more costly to steamship companies than that of other baggage, while the mail carrying vessels have special advantages, facilities and exemptions from delay in most ports. The Government's payments have been one-third greater than an individual would have paid for similar service. The Postmaster-General declines to employ postal appropriations to aid American commerce until specifically instructed to do so by Congress, and adds that the practice of granting pecuniary aid to American lines was pursued for years at such great cost and to so little advantage that it was wholly abandoned. There is no necessity for new lines to carry the mails, and those now in existence have sustained themselves without Government bounty, while the foreign mail service does pay a net revenue. It is argued that this should be applied to the expense of non-supporting branches of the service rather than bestowed on American steamship companies.

The new trunk line pool, it is understood, went into effect December 1, and recognizes a division of business as between the East and West which is entirely new. At the same time the rates were advanced to the basis of the tariff of 1884. The new plan provides for several pools. In one will be placed all the business from this city to points on or beyond a point extending from Detroit southeast to Cleveland, thence south along the line of the Cleveland, Mount Vernon and Delaware to Columbus, and then on south along the line of the Scioto Valley to Portsmouth, Ohio. In the business to and from this city, Buffalo, Suspension Bridge and Niagara Falls the four New York roads will be interested. The traffic to and from Boston and Western points will be divided between the three New York lines with Eastern connections, and the four New England roads with Western connections; but the Central Vermont and the Grand Trunk will not share in the business to Lake Erie points from that city. Canadian traffic out of Boston is divided between the same six roads which control the Western business.

Pedrick & Ayer, of the L. B. Flanders Machine Works, Philadelphia, report steady orders for special tools for railway repair shops. Among other orders they have recently shipped their patent portable valve-seat rotary planing machine to the Baltimore and Ohio Railway Co., Lehigh Valley Railway Co. and Utica and Black River Railway Co.; patent portable locomotive cylinder boring machine to the Atchison, Topeka and Santa Fe Railway; radius link planer attachment to the Savannah, Florida and Western Railway Co.; patent portable crank-pin machine to the Boston and Albany Railway Co.; Atlas patent fuel-cleaning machine to the Pittsburgh and Lake Erie Railway Co., and have other orders on file. They state that their portable cylinder boring machines for boring steam-engine cylinders, &c., in place are, some of them, almost in daily use, and their specialty of Corliss-engine repairs keeps their force in that department very busy.



THE National Cash REGISTER

OF DAYTON, OHIO, U. S. A.

"Don't dump your Cash into a Drawer and not know at night what is there until you count it."—WM. H. MAHER, in *Chicago Inter-Ocean*.

GOOD MORNING,

Mr. Storekeeper, I have a No. 3 Cash Register here which I would like to sell you.

STOREKEEPER.—I have no use for any such arrangement. My clerks are persons of integrity, and make few, if any, mistakes. Good morning! I am very busy now, and will ask you to excuse me.

AGENT.—But, sir, you don't know anything about it, or you would not talk that way. Let me explain to you; it will cost you nothing.

STOREKEEPER.—No! I have the best possible system. It is perfection, and I won't adopt any other.

AGENT.—Maybe yours is better than mine. Please explain.

STOREKEEPER.—You see, I require every clerk to enter on a slip of paper the amount of each sale, and at night I add the amounts of all the tickets together, and see if it balances the cash and credit sales. There now! Can you beat that? What else could I want?

AGENT.—How long does it take to add those tickets, and how near does it balance?

STOREKEEPER.—About one hour and a half, and it often very nearly balances.

AGENT.—

YOU ARE JUST THE MAN

I am looking for. My machine will save your clerks the trouble of writing on a slip the amount of each sale, and will save the paper and pencils. All that a clerk does when he makes a 25 cent sale is to strike the 25 cent key. The bell rings, the 25 cent tablet flies up and remains open until the next sale is made, showing the 25 cents in large black figures, the drawer flies open and, at the same instant, the wheel inside turns one notch, showing that one 25 cent sale is made. All of it is done quicker than your clerk could get his pencil out of his pocket.

STOREKEEPER.—I am not confined to such a small business. I frequently sell large amounts, such as \$10.50. Hence the Register would not answer my purpose. I am sorry, for it looks like a good thing for a small business.

AGENT.—But hold up! Take two fingers, strike the \$10 key with one and the 50 cent key with the other; thus, both tablets jump up quicker than you can think, the 25 cent tablet disappears and the \$10 and 50 cent tablets show up and the \$10 and 50 cent wheels inside each show one sale. You can strike four or five keys at one time.

STOREKEEPER.—How long does it require at the close of each day's business to take off the number and amount of the sales?

AGENT.—I can add up the total amount of the day's sales in less than five minutes, even if they should amount to \$2000 or over.

STOREKEEPER.—It looks as if you had provided for everything.

AGENT.—Now let us turn the wheels all back to 0 with this wrench, and tell your clerks to run the Register for about ten minutes. I will show it to all these people, and will have half the town in, buying something, just to see it work. I will place it on your counter, where it can be seen from nearly every part of the store. It is now ready for use. Tell your clerks to strike the keys and put the money in the drawer.

STOREKEEPER.—Well, one of my clerks has just made a sale, and I will have him register it.

AGENT.—I see that he has pressed the 50 cent key. Standing way back here, I can tell the amount of each sale, as the large figures on the tablets show up. What was it that he sold?

STOREKEEPER.—Four dozen eggs at 12½ cents per dozen.

AGENT.—I see that another clerk has just registered \$1.25. What did he sell?

STOREKEEPER.—He sold a felt hat to the farmer just going out of the door.

AGENT.—

WAS IT THE RIGHT AMOUNT?

STOREKEEPER.—Yes, for I saw the hat while he was trying it on. You see another clerk has just registered 45 cents. I know it is the right amount, for it is for two cans of fruit I saw the clerk sell.

AGENT.—That is one of the many advantages of the Register. The transactions of each and every sale are open to the inspection of the employer, the customer, and to any one who is desirous of looking at the tablets. It may be that certain customers have preferences for certain clerks. It may be that the clerk is a good and a pleasant one, or it may be that he favors the customer in prices; but when you have a Register a clerk cannot favor any customer very long without detection, for the proprietor, with a little attention, can see just what goods are put up for the customer, and then, by noticing the tablet, can see if the proper amount is registered, just what you have been doing, and not thinking that it was only by the use of the Register that you were enabled to do so. When you are absent a friend or employee can look after it for you.

STOREKEEPER.—It does look like a good and convenient thing, but maybe it is not recording properly. I had my clerks keep a record also on paper of the amounts registered, so let us unlock the machine and see if the two accounts agree.

75 Per Cent of the Storekeepers

Of this country insure their goods, invest in fire-proof safes, advertise largely, economize in business and family expenses, and yet at the end of the year find their savings have been decidedly less than expected.



Are You One of the Number?

If so, it will pay you to read every word of this Page.

AGENT.—Well, we will unlock the lid and see what it indicates. Look right along here, between these two guards. Here is one 3 cent sale, four 10 cent sales, five 25 cent sales, one 45 cent sale, one 50 cent sale, one 75 cent sale and one \$1 sale, making a total of \$4.38 registered in these few minutes. You will notice that each denomination can be registered 900 times before it is necessary to turn the wheels back to 0, but whenever the cash is squared, say once a day, you turn the wheels back for a new start.

STOREKEEPER.—

THAT IS INDEED VERY SIMPLE!

and quickly done. The work looks very substantial. Do you employ good workmen?

AGENT.—The superintendent of the factory is from Smith & Wesson's Pistol Works and draws a very large salary. He inspects each machine before it leaves, and if there is the least flaw or defect of any kind it is not shipped. Just see what a large number of testimonials. No two of them are alike. They are from all over the United States, Canada, Great Britain and Holland. Please read them.

STOREKEEPER.—I don't see any names here that I know, and, while I do not doubt but what they are genuine, yet I must know positively before I will buy.

AGENT.—Well, consult Bradstreet's or Dun's Commercial Agency.

STOREKEEPER.—Well that is satisfactory. I see that many of them are solid men.

AGENT.—Now, write to any of the hundreds of names you see and get their opinions.

STOREKEEPER.—Well, tell me what others' experience has been.

AGENT.—That would take too long. I can refer you to over three hundred purchasers with whom I have talked, and I know that you could not buy their registers for five times what they cost providing they could get no others.

STOREKEEPER.—It costs too much. I can't afford to buy it now.

AGENT.—If you will examine it you will see that it is an expensive thing to make. It has required over seven years and the best inventive talent to complete it, at an expense of \$50,000. It is made of the best possible material and will last a lifetime. The parts are interchangeable and the special machinery required to make them is of the most expensive kind. If you will look at the price as an investment, the interest on one of our Registers is not four cents a day. We leave you to say whether it is not worth that amount to insure your cash and have an absolute check upon your credits. You must not, however, expect to get a

BOOK-KEEPER, CASHIER AND CASH-BOY

for nothing. One that never gets up with a headache, never takes a vacation, nor speaks an untruth, but works right along day after day, always for your interest, never tiring, and keeping you thoroughly posted as to every transaction in your store.

STOREKEEPER.—Well, what inducement can you make me to buy now?

AGENT.—We have no agent in your city, and if you will buy now and sign the order for the kind of Register you want we will give you the full agent's discount off on this one for your own use, and also the full commission on all that are sold in your territory hereafter, so long as you are agent, whether you sell them or not; fit up a Register to suit your furniture, carve your name, initials, monogram or a vine upon the lid. We know you will buy sooner or later. No live storekeeper can afford to be without one, so do not wait until your neighbor secures the agency, as well as part of your trade, for then he will charge you the full price and reap the benefit of the commission on your machine.

STOREKEEPER.—How many of them are in use.

AGENT.—Over 1500, and they are endorsed by 1500 of the most successful business men in the United States. There is no risk in ordering, as we guarantee each machine for two years.

STOREKEEPER.—

IF YOU WILL,

and send me as nice a Register as this, I'll sign the order.

AGENT.—Very much obliged to you. I am sure you could not have made a better investment, because the commissions you will receive on other sales that are sure to follow after a machine is introduced will soon pay you back the amount of your register. Should you run across any snags in the sale of the Register please write us full particulars and we will advise you.

STOREKEEPER.—Shall I send you a note at 90 days?

AGENT.—No! Five days after shipment we will draw for the amount, and should you desire to pay the cash you may deduct 5 per cent. from the amount of the draft. Good-bye.

Send for Catalogue to the National Cash Register Company, Iron Block, Dayton, Ohio.

DON'T SIT ROUND

And wait for the corn crop to improve times, but improve business in your own store by buying a Cash Register, and have the satisfaction of knowing that you are getting paid for all of your goods. You will sleep better, save more time for enjoyment, and feel no doubts about what may now be troubling you most.

SAVE \$1,000

WITHIN THE NEXT YEAR

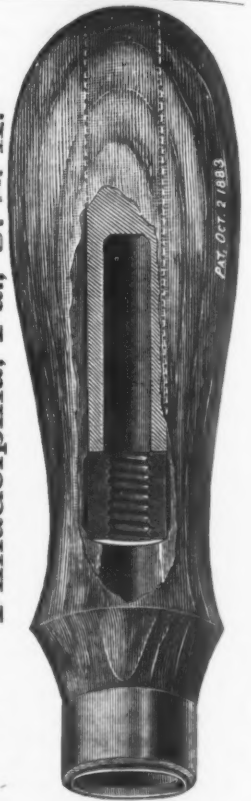
BY PURCHASING

A CASH REGISTER

All Inquiries from California will be referred to Geo. V. Blackman, Agt., 971 Broadway, Oakland, Cal.

ESTABLISHED 1842.

J. BARTON SMITH CO.
Philadelphia, Pa., U. S. A.



They ask us, why we look so cheerful? It's an open secret we are working day and night to fill orders on Screw Tang Files.

GILBERT PARKER, President.

THE J. BARTON SMITH CO'S PATENT SCREW TANG FILES

THE Iron Age Directory AND Index to Advertisements.

Agricultural Implements.

N. Y. Plow Co., 65 Beekman, N. Y. 38
Air Brakes.
Westinghouse Air Brake Co., Pittsburgh, 4

Air Compressors.
Clayton Jans, Brooklyn, N. Y., and
New York City, 59
Norwalk Iron Works, S. Norwalk, 54

Alarm Money Drawers.
Tucker & Dorsey Mfg. Co., Indianapolis, 44

Anti-Friction Metals.
Reeves Paul S., Philadelphia, 56

Avails, Manufacturers of.
Eagle Anvil Works, Trenton, N. J., 9

Arms and Ammunition.
E. C. Meacham Arms Co., St. Louis, Mo., 52
Harrington & Richardson, Worcester,
Mass., 39
J. P. Lovell's Sons, Boston, Mass., 39

Asbestos.
Chalmers-Spence Co., 419 8th, N. Y., 9

Ash Sifters.
Hilchcraft's Sons, Porter, Concord, N. H., 38

Angers and Bits.
Jennings C. E. & Co., 90 Chambers, N. Y., 34
New Haven Copper Co., 204 Pearl, N. Y., 2

Axles, Springs, &c., Manufacturers of.
Gaulter Steel Dept. of Cambria Iron Co.,
Johnstown, Pa., 38
Laggett Spring & Axle Co., Pittsburgh, 38
Wurster F. W., Brooklyn, N. Y., 56

Axes.
Mann W. J. & Co., Lewistown, Pa., 14
Peck A. G. & Co., Cohoes, N. Y., 56

Axe Wedges.
Brooks H. & Co., Boston, Mass., 44

Babbit Metal.
Post K. L. & Co., Peck Slip, N. Y., 40

Bankers.
Gauldard P. W. & Co., 2 Wall, N. Y., 13

Bar Iron.
Virginia Nail and Iron Works Co., Lynch-
burg, Va., 14

Barb Wire & Fence.
Gaulter Steel Department of Cambria
Iron Co., Johnstown, Pa., 38
Hawthorn Steel Barb Fence Co., Burling-
ton, 3
Iowa Barb Wire Co., Keosauqua, Iowa, 3
Washburn & Moen Mfg. Co., Worcester, 2

Bellevue, Manufacturers of.
Bullitt T. H., Cleveland, O., 14
Scott Geo. H., Chicago, Ill., 56

Belt Hooks.
Bevin Bros. Mfg. Co., Easthampton, 10

Belt Hooks.
Browning, Mism & Co., Brooklyn, N. Y., 30

Belt Hooks.
Alexander Bros., 412 N. 3d, Philadelphia, 34
Main Belting Co., Philadelphia, N. Y., 46
N. Y. Belting & Packing Co., 13 & 15 Park
Row, N. Y., 13
Schultz Belting Co., St. Louis, Mo., 38

Bicycles.
Pope Mfg. Co., 597 Washington, Boston, 56

Bird Cages, Makers of.
Lindeman O. & Co., 254 Pearl, N. Y., 3
Maxwell John, 97 West 12th, N. Y., 3
Osborn Mfg. Co., 70 Berkeley, N. Y., 3
Pierce Geo. N. & Co., Buffalo, N. Y., 4

Bit Braces.
Fray John S. & Co., Bridgeport, Conn., 51

Bits.
Brown R. H. & Co., New Haven, Conn., 54

Blasting Supplies.
Aetna Powder Co., Chicago, Ill., 38

Blind Awning Fixtures.
North F. O. & Co., Boston, Mass., 12

Blocks, Tackles, Makers of.
Bagnall & Lord, Boston, Mass., 11
McCoy & Sanders, 36 Warren, N. Y., 56
McMillan Wm. H., 113 South, N. Y., 11
Penfield Block Co., Lockport, N. Y., 14
Shubert & Cottingham, Philadelphia, Pa., 11

Boiler Plates.
Wm. McVain & Sons, Reading, Pa., 53
The Seidel & Hastings Co., Wilmington,
Del., 30

Boiler Scale Preventives.
International Mfg. Co., Cleveland, Ohio, 38

Boilers, Steam.
Babcock & Wilcox Co., 30 Cortlandt, N. Y., 12
Edge Moor Iron Co., 70 Liberty, N. Y., 15
Harrison Boiler Works, Philadelphia, 55
N. Y. Engineering Co., 64 Cortlandt, N. Y., 10
Weberill Robt. & Co., Chester, Pa., 55

Bolt and Rivet Clippers.
Chalmers, Brother & Co., Philadelphia, 4

Bolt Cutters.
Howard Iron Works, Buffalo, N. Y., 33
Sellers Wm. & Co., Philadelphia, 55
Liberty, N. Y., 55
Wells Bros. & Co., Greenfield, Mass., 46

Borax.
Fisher Chas., 81 Maiden Lane, N. Y., 9

Boring Machines.
Lawrence Curry Comb Co., 309 E. 23d,
N. Y., 50

Brass, Manufacturers of.
Ansania Brass & Copper Co., 19 Cliff,
N. Y., 9
Bridgeport Brass Co., 19 Murray, N. Y., 2
David John & Sons, 109 John, N. Y., 14
Bohms, Booth & Haydon, Park
St., N. Y., 14
Plume & Atwood Mfg. Co., 18 Murray,
N. Y., 2
Socille Mfg. Co., 421 Broome, N. Y., 2
Waterbury Brass Co., 290 E. 1st, N. Y., 2

Brass Butt Hinges.
Tebout W. J., 15 & 17 Chambers, N. Y., 30

Brass Foundry.
McFarland Wm., Trenton, N. J., 4
Reeves Paul S., Philadelphia, 56

Brass Goods, Co., Waterbury, Conn., 2

Bridge Builders.
Moseley Iron Bridge & Roof Co., 5 Dey,
N. Y., 52
Union Bridge Co., 18 Broadway, N. Y., 52

Buckets, Pump and Elevator.
Clark W. J., 90 John, N. Y., 46

Builders' Hardware.
L. S. Spencer's Sons, Guilford, Conn., 47
Nashua Hardware Co., Reading, Pa., 52
Winnipeg Mfg. Co., Cleveland, O., 12

Butcher and Shoe Knives, Manu-
facturers of.
Wilson John, Sheffield, England, 48

Bulls and Hinges.
Chicago Spring & Axle Co., Chicago, Ill., 55
Sabin Machine Co., Montpelier, Vt., 55
Smith & Edge Mfg. Co., Bridgeport, 40
Stanley Works Co., New Britain, Conn., 12
Union Mfg. Co., 103 Chambers, N. Y., 7

Can Makers' Tools and Machines.
Niagara Stamping and Tool Co., Buffalo,
N. Y., 51

Can Openers.
National Specialty Co., North East-
on, Mass., 38
The Fred J. Meyers Mfg. Co., Covington,
La., 3

Car Axles.
Roberts A. & P. Co., 205 S. 4th, Phila., 6

Carpet Stretchers.
Shader & Lord, Laporte, Ind., 9

Car Wheels.
Edon Foundry & Pullman Car Wheel
Works, Chicago, Ill., 8
Whitney A. & Sons, Philadelphia, 5

Carriage Belts, Makers of.
Norwich Bolt Works, Norwich, Conn., 12

Carriage Hardware, Makers of.
E. D. Clapp Mfg. Co., Auburn, N. Y., 10
Smith H. & Co., Plantville, Conn., 13
Woodruff, Miller & Co., Mount Carmel, Ill., 18

Cash Registers.
National Cash Register Co., Dayton, O., 23

Casters.
Stearns E. C. & Co., Syracuse, N. Y., 96

Casting Iron.
S. Cheney & Son, Manlius, N. Y., 54
Devitt Thos. & Co., Philadelphia, Pa., 7
Haight & Clark, Albany, N. Y., 10
Hammer & Co., Bradford, Conn., 14
North Brothers Philadelphia, Pa., 53
Springfield Foundry Co., Springfield, O., 38
Tucker & Dorsey Mfg. Co., Indianapolis, N. Y., 44
Weberill Robt. & Co., Chester, Pa., 55

Casting Iron and Brass.
L. S. Spencer's Sons, Guilford, Conn., 47

Casting Iron.
S. Cheney & Son, Manlius, N. Y., 54
Devitt Thos. & Co., Philadelphia, Pa., 7
Haight & Clark, Albany, N. Y., 10
Hammer & Co., Bradford, Conn., 14
North Brothers Philadelphia, Pa., 53
Springfield Foundry Co., Springfield, O., 38
Tucker & Dorsey Mfg. Co., Indianapolis, N. Y., 44
Weberill Robt. & Co., Chester, Pa., 55

Casting Iron and Brass.
L. S. Spencer's Sons, Guilford, Conn., 47

Casting Iron.
S. Cheney & Son, Manlius, N. Y., 54
Devitt Thos. & Co., Philadelphia, Pa., 7
Haight & Clark, Albany, N. Y., 10
Hammer & Co., Bradford, Conn., 14
North Brothers Philadelphia, Pa., 53
Springfield Foundry Co., Springfield, O., 38
Tucker & Dorsey Mfg. Co., Indianapolis, N. Y., 44
Weberill Robt. & Co., Chester, Pa., 55

Casting Iron and Brass.
L. S. Spencer's Sons, Guilford, Conn., 47

Casting Iron.
S. Cheney & Son, Manlius, N. Y., 54
Devitt Thos. & Co., Philadelphia, Pa., 7
Haight & Clark, Albany, N. Y., 10
Hammer & Co., Bradford, Conn., 14
North Brothers Philadelphia, Pa., 53
Springfield Foundry Co., Springfield, O., 38
Tucker & Dorsey Mfg. Co., Indianapolis, N. Y., 44
Weberill Robt. & Co., Chester, Pa., 55

Casting Iron and Brass.
L. S. Spencer's Sons, Guilford, Conn., 47

Casting Iron.
S. Cheney & Son, Manlius, N. Y., 54
Devitt Thos. & Co., Philadelphia, Pa., 7
Haight & Clark, Albany, N. Y., 10
Hammer & Co., Bradford, Conn., 14
North Brothers Philadelphia, Pa., 53
Springfield Foundry Co., Springfield, O., 38
Tucker & Dorsey Mfg. Co., Indianapolis, N. Y., 44
Weberill Robt. & Co., Chester, Pa., 55

Casting Iron and Brass.
L. S. Spencer's Sons, Guilford, Conn., 47

Casting Iron.
S. Cheney & Son, Manlius, N. Y., 54
Devitt Thos. & Co., Philadelphia, Pa., 7
Haight & Clark, Albany, N. Y., 10
Hammer & Co., Bradford, Conn., 14
North Brothers Philadelphia, Pa., 53
Springfield Foundry Co., Springfield, O., 38
Tucker & Dorsey Mfg. Co., Indianapolis, N. Y., 44
Weberill Robt. & Co., Chester, Pa., 55

Casting Iron and Brass.
L. S. Spencer's Sons, Guilford, Conn., 47

Casting Iron.
S. Cheney & Son, Manlius, N. Y., 54
Devitt Thos. & Co., Philadelphia, Pa., 7
Haight & Clark, Albany, N. Y., 10
Hammer & Co., Bradford, Conn., 14
North Brothers Philadelphia, Pa., 53
Springfield Foundry Co., Springfield, O., 38
Tucker & Dorsey Mfg. Co., Indianapolis, N. Y., 44
Weberill Robt. & Co., Chester, Pa., 55

Casting Iron and Brass.
L. S. Spencer's Sons, Guilford, Conn., 47

Casting Iron.
S. Cheney & Son, Manlius, N. Y., 54
Devitt Thos. & Co., Philadelphia, Pa., 7
Haight & Clark, Albany, N. Y., 10
Hammer & Co., Bradford, Conn., 14
North Brothers Philadelphia, Pa., 53
Springfield Foundry Co., Springfield, O., 38
Tucker & Dorsey Mfg. Co., Indianapolis, N. Y., 44
Weberill Robt. & Co., Chester, Pa., 55

Casting Iron and Brass.
L. S. Spencer's Sons, Guilford, Conn., 47

Casting Iron.
S. Cheney & Son, Manlius, N. Y., 54
Devitt Thos. & Co., Philadelphia, Pa., 7
Haight & Clark, Albany, N. Y., 10
Hammer & Co., Bradford, Conn., 14
North Brothers Philadelphia, Pa., 53
Springfield Foundry Co., Springfield, O., 38
Tucker & Dorsey Mfg. Co., Indianapolis, N. Y., 44
Weberill Robt. & Co., Chester, Pa., 55

Casting Iron and Brass.
L. S. Spencer's Sons, Guilford, Conn., 47

Casting Iron.
S. Cheney & Son, Manlius, N. Y., 54
Devitt Thos. & Co., Philadelphia, Pa., 7
Haight & Clark, Albany, N. Y., 10
Hammer & Co., Bradford, Conn., 14
North Brothers Philadelphia, Pa., 53
Springfield Foundry Co., Springfield, O., 38
Tucker & Dorsey Mfg. Co., Indianapolis, N. Y., 44
Weberill Robt. & Co., Chester, Pa., 55

Casting Iron and Brass.
L. S. Spencer's Sons, Guilford, Conn., 47

Casting Iron.
S. Cheney & Son, Manlius, N. Y., 54
Devitt Thos. & Co., Philadelphia, Pa., 7
Haight & Clark, Albany, N. Y., 10
Hammer & Co., Bradford, Conn., 14
North Brothers Philadelphia, Pa., 53
Springfield Foundry Co., Springfield, O., 38
Tucker & Dorsey Mfg. Co., Indianapolis, N. Y., 44
Weberill Robt. & Co., Chester, Pa., 55

Casting Iron and Brass.
L. S. Spencer's Sons, Guilford, Conn., 47

Casting Iron.
S. Cheney & Son, Manlius, N. Y., 54
Devitt Thos. & Co., Philadelphia, Pa., 7
Haight & Clark, Albany, N. Y., 10
Hammer & Co., Bradford, Conn., 14
North Brothers Philadelphia, Pa., 53
Springfield Foundry Co., Springfield, O., 38
Tucker & Dorsey Mfg. Co., Indianapolis, N. Y., 44
Weberill Robt. & Co., Chester, Pa., 55

Casting Iron and Brass.
L. S. Spencer's Sons, Guilford, Conn., 47

Casting Iron.
S. Cheney & Son, Manlius, N. Y., 54
Devitt Thos. & Co., Philadelphia, Pa., 7
Haight & Clark, Albany, N. Y., 10
Hammer & Co., Bradford, Conn., 14
North Brothers Philadelphia, Pa., 53
Springfield Foundry Co., Springfield, O., 38
Tucker & Dorsey Mfg. Co., Indianapolis, N. Y., 44
Weberill Robt. & Co., Chester, Pa., 55

Casting Iron and Brass.
L. S. Spencer's Sons, Guilford, Conn., 47

Casting Iron.
S. Cheney & Son, Manlius, N. Y., 54
Devitt Thos. & Co., Philadelphia, Pa., 7
Haight & Clark, Albany, N. Y., 10
Hammer & Co., Bradford, Conn., 14
North Brothers Philadelphia, Pa., 53
Springfield Foundry Co., Springfield, O., 38
Tucker & Dorsey Mfg. Co., Indianapolis, N. Y., 44
Weberill Robt. & Co., Chester, Pa., 55

Casting Iron and Brass.
L. S. Spencer's Sons, Guilford, Conn., 47

Casting Iron.
S. Cheney & Son, Manlius, N. Y., 54
Devitt Thos. & Co., Philadelphia, Pa., 7
Haight & Clark, Albany, N. Y., 10
Hammer & Co., Bradford, Conn., 14
North Brothers Philadelphia, Pa., 53
Springfield Foundry Co., Springfield, O., 38
Tucker & Dorsey Mfg. Co., Indianapolis, N. Y., 44
Weberill Robt. & Co., Chester, Pa., 55

Casting Iron and Brass.
L. S. Spencer's Sons, Guilford, Conn., 47

Casting Iron.
S. Cheney & Son, Manlius, N. Y., 54
Devitt Thos. & Co., Philadelphia, Pa., 7
Haight & Clark, Albany, N. Y., 10
Hammer & Co., Bradford, Conn., 14
North Brothers Philadelphia, Pa., 53
Springfield Foundry Co., Springfield, O., 38
Tucker & Dorsey Mfg. Co., Indianapolis, N. Y., 44
Weberill Robt. & Co., Chester, Pa., 55

Casting Iron and Brass.
L. S. Spencer's Sons, Guilford, Conn., 47

Casting Iron.
S. Cheney & Son, Manlius, N. Y., 54
Devitt Thos. & Co., Philadelphia, Pa., 7
Haight & Clark, Albany, N. Y., 10
Hammer & Co., Bradford, Conn., 14
North Brothers Philadelphia, Pa., 53
Springfield Foundry Co., Springfield, O., 38
Tucker & Dorsey Mfg. Co., Indianapolis, N. Y., 44
Weberill Robt. & Co., Chester, Pa., 55

Casting Iron and Brass.
L. S. Spencer's Sons, Guilford, Conn., 47

Chains.
Bradley & Co., 816 Richmond St., Phila., 5
Covert Mfg. Co., West Troy, N. Y., 39
W. H. Haskell Co., Pawtucket, R. I., 38

Chemicals.
Brainerd A. F., Birmingham, Ala., 42

Cherry Stoppers.
Elmer & Amend, 205 Third av., N. Y., 49

Chisels, Manufacturers of.
Buck Bros., Millbury, Mass., 13

Chucks.
Brown R. H. & Co., New Haven, Conn., 54
Buck & Edge Mfg. Co., Bridgeport, Conn., 40
Union Mfg. Co., 90 Chambers, N. Y., 7

Clippers, Horse and Barber's.
Lee Jesse & Son, Philadelphia, Pa., 41

Clock Springs, &c.
Dunbar Bros., Bristol, Conn., 7

Clothes Dryers.
Campbell John, Manchester, N. H., 36

Coal.
Borden & Lovell, 70 West, N. Y., 4
Foster & Co., 111 Broadway, N. Y., 48

Coffee and Spice Mills.
Enterprise Mfg. Co., Philadelphia, Pa., 50
Lane Bros., Poughkeepsie, N. Y., 49

Coke.
Schoonmaker J. M., Pittsburgh, 48

Commission Merchants, Iron, Steel, &c.
Howard, Childs & Co., Pittsburgh, Pa., 4

Copper.
New Haven Copper Co., 204 Pearl, N. Y., 2

Cordage.
Elizabethport Steam Cordage Co., 48,
South, N. Y., 34

Cork Screws.
Howe Bros. & Hulbert, West Winsted,
Conn., 10

Corrugated Iron.
Cincinnati Corrugating Co., Cincinnati, 2
Kinsley & Miller, Chicago, Ill., 52
N. Y., 52
Manhattan Hdw. Co., Reading, Pa., 52
Bex A. C. & Co., Philadelphia, Pa., 50
Underhill, Clark & Co., 90 Chambers, N. Y., 10

Cotton Presses.
Mecklenburg Iron Works, Charlotte, N. C., 44

Coverings, Boiler and Pipe.
Chalmers-Spence Co., 419 8th, N. Y., 9
Shields & Brown, Chicago, Ill., 53

Cranes.
Vale & Towne Mfg. Co., Stamford, Conn., 11
Seldin H. B., Philadelphia, Pa., 51

Cupolas.
Collins Furnace Co., Detroit, Mich., 46
Smith & Sayre Mfg. Co., 245 E. 1st, N. Y., 55

Curry Combs.
Lawrence Curry Comb Co., 309 E. 23d,
N. Y., 50

Cutlery, Manufacturers of.
American Cutlery Co., Chicago, Ill., 47
Goodell Co., Antrim, N. H., 36

Door Checkers.
Ives H. B. & Co., New Haven, Conn., 41

Door Checks and Springs.
Victor Mfg. Co., Easthampton, 10

Door Hangers, House and Barn.
Cochran Iron Foundry and Machine Co.,
Cochran, N. Y., 46
Lane Bros., Poughkeepsie, N. Y., 3
Scranton Mfg. Co., Chicago, Ill., 52
Schultz Belting Co., St. Louis, Mo., 38

Door Holders.
Sise, Gibson & Co., 100 Chambers, N. Y., 40

Door Knobs.
Victor Door Knob Co., Cleveland, O., 40

Door Springs.
Harrison Bolt Works, Norwich, Conn., 12

Drilling Machines.
L. B. Flinders Machine Co., Philadelphia, 38

Drop Forgings.
Buffalo Hammer Co., Buffalo, N. Y., 42
Buck & Edge Mfg. Co., Bridgeport, Conn., 40
The Billings & Spencer Co., Hartford,
Conn., 3
William H. & Co., 4 to 15 Richards st.,
Brooklyn, 53

Drop Presses.
Stiles & Parker Press Co., Middletown,
Conn., 56
Waterbury Farrel Foundry and Machine
Co., Waterbury, Conn., 46
Williams, White & Co., Moline, Ill., 9

Dust Pans.
Steel Edge Dust Pan Co., Boston, Mass., 34

Dynamite.
Aetna Powder Co., Chicago, Ill., 38

Eave Trough Hangers.
Burden Iron Co., Troy, N. Y., 34

Edge Tools, Makers of.
Doehmer M., 95 Beane, N. Y., 48
White L. & J., Buffalo, N. Y., 40

Egg Beaters.
Dietrich & Co., Philadelphia, Pa., 30

Electric Engineering.
Maloux & Rice, 92 Liberty, N. Y., 51

Electric Lighting.
Brush-Swan Electric Light Co., 204 to 210
Elizabeth, N. Y., 52

Electric Makers of.
Stokes & Parrish Machine Co., Phila., 55

Emercy, Paper, Cloth, &c.
Graham, J. H. & Co., 113 Chambers, N. Y., 8
Graham, J. H. & Co., 113 Chambers, N. Y., 8

Engineers.
Gordon, Strobel & Laurens, Phila., Pa., 5

Engines, Gas.
Clark Gas Engine Co., Philadelphia, Pa., 56
The Cummer Engine Co., Cleveland, O., 49
Bonnell, Botsford & Co., Youngstown, O., 4
Borden & Lovell, 70 West, N. Y., 4
Conroy Daniel, 68 W. Washington, N. Y., 4
Cos Justice, Jr., 508 to 512 Water, N. Y., 4
Harrison John, 508 to 512 Water, N. Y., 4
Hart, Wm. H. & Co., 508 to 512 Water, N. Y., 4
Himrod Chas. & Co., Chicago, Ill., 4
Hoffman J. W. & Co., 208 S. Fourth, Phil.,
Pa., 4
Kelsey Jerome, Philadelphia, Pa., 5
Lindberg & Son, Philadelphia, Pa., 5
Ludwig & Son, Philadelphia, Pa., 5
Ogden & Wallace, 95 to 97 Elm, N. Y., 4
Pieron & Co., 34 to 37 West, N. Y., 4
Wallace Wm. & Co., 400 Chestnut, Phila., 5
Wyckoff & Son, Elmira, N. Y., 13

Engines, Steam.
Clark Gas Engine Co., Philadelphia, Pa., 56
The Cummer Engine Co., Cleveland, O., 49
Bonnell, Botsford & Co., Youngstown, O., 4
Borden & Lovell, 70 West, N. Y., 4
Conroy Daniel, 68 W. Washington, N. Y., 4
Cos Justice, Jr., 508 to 512 Water, N. Y., 4
Harrison John, 508 to 512 Water, N. Y., 4
Hart, Wm. H. & Co., 508 to 512 Water, N. Y., 4
Himrod Chas. & Co., Chicago, Ill., 4
Hoffman J. W. & Co., 208 S. Fourth, Phil.,
Pa., 4
Kelsey Jerome, Philadelphia, Pa., 5
Lindberg & Son, Philadelphia, Pa., 5
Ludwig & Son, Philadelphia, Pa., 5
Ogden & Wallace, 95 to 97 Elm, N. Y., 4
Pieron & Co., 34 to 37 West, N. Y., 4
Wallace Wm. & Co., 400 Chestnut, Phila., 5
Wyckoff & Son, Elmira, N. Y., 13

Engines, Steam.
Clark Gas Engine Co., Philadelphia, Pa., 56
The Cummer Engine Co., Cleveland, O., 49
Bonnell, Botsford & Co., Youngstown, O., 4
Borden & Lovell, 70 West, N. Y., 4
Conroy Daniel, 68 W. Washington, N. Y., 4
Cos Justice, Jr., 508 to 512 Water, N. Y., 4
Harrison John, 508 to 512 Water, N. Y., 4
Hart, Wm. H. & Co., 508 to 512 Water, N. Y., 4
Himrod Chas. & Co., Chicago, Ill., 4
Hoffman J. W. & Co., 208 S. Fourth, Phil.,
Pa., 4
Kelsey Jerome, Philadelphia, Pa., 5

Trade Report.

New York Iron Market.

American Pig.—Beyond a fair current business nothing is doing. We hear of only occasional negotiations for 1886 delivery of Foundry Irons, and opinions concerning the future continue divided. Some of the furnaces are distinctly holding back; others have adopted a waiting policy, and are content to let matters go along until the leading companies have announced what position they will take. It is not considered likely that this will be done at an early date. It is held by some that no substantial advance can be long maintained, because, after all, the coming season is not a busy one for foundrymen. The machine shops at least will certainly be the last to feel any substantial improvement in business. Forge Iron is reported scarcer from all parts of the country, and offers at an advance of 25¢ over recent quotations as the basis for large business for 1886 have been declined. On the other hand there have been closed in this market during the last month large parcels at lower figures than had yet been made in 1885, and a neighboring mill has contracted until March on that basis. We quote standard brands of Lehigh and North River Irons, tidewater delivery, nominally as follows: No. 1 X Foundry, \$18 @ \$18.50; No. 2 X Foundry, \$16 @ \$16.50; Gray Forge, \$15.25 @ \$15.50. Outside brands sell for 50¢ @ 75¢ less than our quotations.

Scotch Pig.—Importers here are asking more money, as freights have advanced, and in some instances are securing better figures. Buyers, however, frequently decline to pay more than they have been doing. Any material advance without a corresponding rise in American Iron will simply cut off some of the limited business doing in Scotch Iron. We quote nominally as follows for small lots: Coltness, \$20 @ \$20.50 to arrive; Gartsherrie, \$19.50 to arrive; Shotts, \$19.50 @ \$19.75 to arrive; Cambro and Glengarnock, \$18.50 to arrive; Summerlee, \$19 @ \$19.50 to arrive; Dalmellington, \$18.50 @ \$19 to arrive; Eglinton, \$17.50 @ \$18 to arrive, and Clyde, \$18 @ \$18.50 to arrive.

Bessemer Pig.—The market has been quiet for Foreign Bessemer, which is held too high to suit buyers views. Sellers quote \$20.25 @ \$20.50. In Spiegeleisen there have been sales of English aggregating about 3000 tons, of which one lot of 2000 tons was placed earlier in the week at \$27.25. There has also been a sale of a moderate lot of 30¢ at about \$31.50. Sellers now ask \$28. The German producers of Spiegeleisen have formed a combination agreeing to restrict production.

Iron Ore.—Foreign Ores are held stiffly, and are developing an upward tendency. In Domestic Bessemer we note a recent sale of 12,000 tons of Mahopac at private terms.

Bar Iron.—The rise in Old Material has had the effect of slightly stiffening Common Iron. The demand is moderate. We quote for delivery here in round lots: Common Iron, 1.45¢ @ 1.55¢; Medium, 1.55¢ @ 1.65¢, and Refined Iron, 1.75¢ @ 1.9¢, with half extras. Steel, 1.85¢ @ 2.10¢ base, according to quality. Store prices are 1.6¢ @ 1.75¢ for Common, 1.75¢ @ 1.8¢ for Medium, and 1.9¢ @ 2¢ for Refined.

Structural Iron.—Some of the mills are very busy with bridgework, one of them reporting orders on hand for the next four months. In Beams we note a lot of 100 tons for the approach warehouse of the Brooklyn Bridge, with some girder-work in addition. We quote Angles 1.95¢ @ 2¢, delivered, and Tees at 2.25¢ @ 2.35¢ for round lots. Steel Angles are quoted 2.30¢ @ 2.45¢, according to quality. Store quotations remain 2.2¢ @ 2.4¢ for Angles, and 2.5¢ @ 2.7¢ for Tees. American Beams and Channels are 3¢ base from dock for all orders.

Plates.—There is a fair amount of inquiry. We quote for round lots: Common or Tank, 2¢ @ 2.1¢; Refined, 2¼¢ @ 2½¢; Shell, 2.4¢ @ 2½¢; Flange, 3.4¢ @ 3½¢; Extra Flange, 4¢ @ 4¼¢. For small lots of Steel Plates the quotations are as follows: Ship, 3¢ on dock; Tank, 2½¢ on dock; Boiler, 3¢ @ 3¼¢ for Shell, 3½¢ @ 4¢ for Flange, and 4¢ @ 5¼¢ for Extra Flange and Fire-Box.

Merchant Steel.—Quotations for the range from ordinary to good grades are as follows: American Tool Steel, 7½¢ @ 10¢; Tool Steel of special grades and finer qualities, 12¢ @ 20¢; Crucible Machinery, 4.5¢ @ 6¢; Spring and Tire, 2¼¢ @ 2½¢; Open-Hearth Machinery, 2¼¢ @ 2½¢, and Bessemer Machinery, 2¢ @ 2½¢; English Tool, 13½¢ @ 15½¢; Common grades, 7¢ @ 9¢.

Steel Rails.—Only a very light business has been done during the week. The market is not so strong as it has been, and from the West come reports as yet unconfirmed of sales as low as \$33.50. It is rumored that negotiations are progressing looking to the increase of the allotment to 1,000,000 tons, and it is stated that the majority of the mills have already signified their willingness to assent to it. This is a surprise to many, since it was not believed that such a step would be taken until a greater number of the mills had sold very closely up to their former allotment. It was known that at least three of them had not placed more than

a comparatively small part of the tonnage awarded to them. This action, if it is taken, will, however, relieve the association from the odium of having put undue pressure upon buyers. The purchase of the Chicago, Burlington and Quincy Railroad turns out to be heavier than was anticipated, the quantity involved being not less than 10,000 tons. The matter is not quite clear as yet, and there is some explanation due American industries for that action. They are paying \$100,000 more at least above the current market price. In addition to this lot, the Vanderbilt system has taken 10,000 tons for those sections which lie in Canada. This, of course, has nothing to do with the American market. We learn, however, that negotiations are pending for the sale of 5000 tons of English Rails to an American road.

Steel Wire Rods.—There has not been any movement of any consequence thus far. The foreign market is reported stiff at £5.14/ @ £5.15/ . We quote nominally \$42 @ \$42.50.

Old Rails.—We hear of transactions aggregating about 700 tons in this market at or near \$18.50. Three New England railroads have each sold 2000 tons, or 6000 tons in all, to speculators at \$20. There has been a sale, too, of English Double Heads at about \$20.25 @ \$20.50, and negotiations are now pending for an additional lot.

Scrap.—Scrap is developing a firmer tendency. We hear of only small sales.

Rail Fastenings.—As foreshadowed in our last, the Spike Association have advanced the price to 2.10¢. Considerable business was done for 1886 delivery during the past week. We quote 2.75¢ for Bolts and Square Nuts, 2.9¢ @ 3¢ for Bolts and Hexagon Nuts, and 1.75¢ for Splice Bars.

Metal Exchange.

The following transactions have been reported at the Metal Exchange:

FRIDAY, November 27.	
10 tons Tin, January	30.65¢
10 tons Tin, February	30.65¢
SATURDAY, November 28.	
10 tons Tin, March	30.65¢
37,500 lb Lake Copper, March	11.30¢
25,000 lb Lake Copper, December	11.30¢
MONDAY, November 30.	
300 tons Pig Iron Certificates, March	\$17.50
12,500 lb Lake Copper, March	11.10¢
TUESDAY, December 1.	
15 tons Tin, January	30.65¢

Philadelphia.

Office of The Iron Age, 230 South Fourth St., PHILADELPHIA, December 1, 1885.

Pig Iron.—The market has been rather quiet, owing to the fact that sellers have no desire to enter orders, except for very limited quantities. By the same rule consumers have made but few inquiries, fearing that such a course would stiffen prices unnecessarily. Dullness, therefore, does not in this case indicate weakness or anything approaching to it. On the contrary there are evidences of increasing strength, and there is but little risk in predicating a general revision of quotations in course of a few days, more or less. Regarded from to-day's standpoint there is no reason to expect more than about 50¢ per ton advance, a rate which would be cheerfully accepted by both buyers and sellers, if officially announced. In the mean time buyers object to paying higher rates until such announcement is made, and sellers are all waiting for some one else to make the first move. The consequence is that, while quotations are nominally \$15.50, \$16 and \$18 for the three grades, actual business is done at higher figures, only small orders being taken here and there at the nominal rates. Under these conditions 50¢ advance seems certain; possibly \$1 more may be obtained for small lots, but there is no reason to doubt that large buyers will be able to place orders for all they want at about \$16 for Gray Forge, \$16.50 for No. 2 and \$18.50 for No. 1 Foundry. As to the volume of business it may be said that a moderate increase is pretty well assured, with quite a possibility of a very large increase toward spring. Meanwhile contracts renewed within the next two or three weeks are likely to be on the basis above named; beyond that it is quite impossible to say what may be done. The capacity for production is very great, and, with prices a dollar or two higher than are now quoted, the supply will be far greater than it has been for the past year or two. Still the position is such that no very confident predictions can be made, except that too rapid an advance will be likely to prove more injurious in the long run than no advance at all. Prospects are favorable for a good, healthy trade, but the experience of 1881 should not be forgotten, although it is hardly likely that there will be any such demand as there was then, unless speculation becomes equally wild.

Foreign Iron.—There is an active inquiry from large buyers, with a probability that a considerable quantity would be taken at figures quoted two or three weeks ago. Sellers have advanced their limits to about \$20 @ \$20.50 for Bessemer and \$27 for 20% Spiegel, subject to cable confirmation. Possibly some concessions might be made on firm offers, but the feeling in Great Britain is unusually sensitive, in the belief that a "boom" is at hand.

Muck Bars.—There is a pretty fair demand, but sales have been at slightly lower figures for December delivery—say \$27 @

\$27.50 at mill. There is no pressure to sell, however, and prices are firm.

Blooms.—The market shows no change, and for such lots as are taken prices are about as follows: Soft Basic Blooms \$33.50 @ \$35; Billets, \$38 @ \$39, and Siemens-Martin, \$40 @ \$42; extra quality, \$43 @ \$45; Domestic Blooms, \$30.50 @ \$32, delivered, for Nail Plate, and \$35 @ \$36 for Plate and Sheet Blooms; Charcoal Blooms, \$50 @ \$52; Run-out Anthracite, \$43 @ \$44; Scrap Blooms, \$32 @ \$33; Northern Ore Blooms, \$32.

Bar Iron.—Business in this department is very quiet, and for Bars prices are barely steady. Specialties keep the mills pretty well employed, however, so that on the whole there is less complaint than usual. At this season dullness is usually expected, but there is a general impression that business will be active after the turn of the year. Bars are not called for, except in very small lots, but Skelp Iron has sold in large lots and is still wanted at about 1.80¢ @ 1.82½¢, with 1.85¢ asked, rather firmly. Bars 1.7¢ to 1.75¢ for best qualities, down @ 1.55¢ @ 1.65¢ for common and medium grades.

Plate and Tank Iron.—The demand is not active at present, and as a rule mills are finishing up their orders somewhat rapidly. Steel Plates come in sharp competition with the better grades, and the demand for Ordinary Plate is rather light, owing to the dullness in shipbuilding and among other large consumers. There is a large amount of work in sight, however, but it is hardly likely that much will be done until after the holidays. Meanwhile prices are about as last quoted, viz.: Ordinary Plate, 2¢; Tank, 2.1¢; Shell, 2.5¢; Flange, 3.5¢; Fire-Box, 4.25¢; Steel Plates, Shell, 3.25¢; Flange, 3.5¢; Fire-Box, 4¢.

Structural Iron.—As a rule the demand is said to be rather disappointing, but, notwithstanding that, a very considerable amount of business has been placed within the past 10 days. Two contracts will absorb from 10,000 to 15,000 tons, and others may be considered as closed for at least as much more. Work will not be begun on these for some time, however, so that the effect may not be felt immediately, but unless something very unexpected occurs the spring of 1886 will be the busiest we have had since 1880 and 1881. In other directions also business is looming up in large proportions, and there is ample reason for the most favorable anticipations. Prices about as before, viz.: Bridge Plate, 2¢ @ 2.1¢; Angles, 2¢; Tees, 2.3¢ @ 2.4¢, and Beams and Channels, 3¢.

Sheet Iron.—The demand is quite large, considering the season, and mills are pretty well employed in meeting current requirements. Prices are steady and unchanged as follows:

Best Refined, Nos. 26, 27 and 28	4¢
Best Refined, Nos. 18 to 25	3½¢
Common, ¼¢ less than the above	
Best Bloom Sheets, Nos. 26 to 28	5¢
Best Bloom Sheets, Nos. 22 to 25	4½¢
Best Bloom Sheets, Nos. 16 to 21	4¢
Blue Annealed	3¢
Best Bloom, Galvanized, discount	57½¢
Common, discount	62½¢

Wrought Iron Pipe.—There is no change worthy of mention in the Pipe market. Prices are well maintained at last week's quotations. The demand has fallen off somewhat; consequently, orders can be filled with more promptness than they have been for some time. Discount as follows: Lap-Welded Black Pipe, 60% off list price; Butt-Welded do., 42½%; Butt-Welded Galvanized, 32½%; Lap-Welded do., 42½%; Boiler Tubes, 55%.

Nails.—The demand is less urgent, but prices are steady; stocks are increasing somewhat and dealers have less trouble in filling orders. Prices remain at \$2.75, less usual discount.

Steel Rails.—The demand continues to be quite urgent, and sales during the week have been at very full quotations. One sale of several thousand tons is reported at \$35. f.o.b. cars at an Eastern mill, with \$34.50 @ \$35 as the usual asking prices. Most of the mills are as full of orders as they care to be, and unless to their regular trade are somewhat reluctant to quote prices.

Spikes.—There is an active demand for Railroad Spikes, with standard sizes firm at 2.10¢, New York or Philadelphia. A further advance is considered probable in the near future.

Old Rails.—The supply available for spot delivery is very small, with sales of lots for near-by delivery at \$20.25; Harrisburg and vicinity, \$20.50, and further West \$21 @ \$21.50. Spot lots of Old T's would bring \$19 @ \$19.50, but the only Rails offered are Double Heads at \$20. There is a good demand for Rails, and holders show increasing confidence in values.

Scrap Iron.—The demand is a little irregular, and except for Old Steel Rails and Car Wheels is not very active. Prices are about as before. No. 1 Wrought Scrap, \$18 @ \$19; No. 2 do., \$12 @ \$13; Horse Shoes, \$22 @ \$23; Turnings, \$13 @ \$14; Old Car Wheels, \$14.50 @ \$15.50; Old Steel Rails, \$16; Fish Plates, \$22 @ \$23; Cast Scrap, \$13.50 @ \$14; do. Turnings, \$10 @ \$10.50.

Pittsburgh.

Office of The Iron Age, 77 Fourth Avenue, PITTSBURGH, Pa., December 1, 1885.

There is undoubtedly a better feeling in general business, and the indications point to a decided change for the better early in the new year. The market for Raw Iron is more active and firmer. Intimations are

thrown out by those who are well informed that a boom in Pig Iron within the next week or two is not improbable. The great event of the week was the visit of the Ordinance Committee of the House of Representatives. The members of the committee, so far as can be learned, were very favorably impressed with Pittsburgh. This city has many advantages not enjoyed by competitors, chief among which is natural gas, and it is claimed by those who are well informed in regard to the matter that the chances for securing the prize are very good. It is said that Mr. Randall, chairman of the committee, is favorably inclined to Pittsburgh. The labor situation remains much the same as a week ago. The coal miners and nailers are still out, but the bottom is likely to fall out of the strike of the former at almost any time. The nailers, who have been idle for six months, still express a determination to hold out, but as the case now stands the manufacturers have the best of it; the latter are confident of their ability to overcome the strikers this time.

Iron Ore.—There is an increasing demand for all grades of Ore, Bessemer in particular, with but little of the latter to be had, and but for this a number of furnaces now idle would be started up on Bessemer Iron. The Republic Ore Co. have put up prices 50¢ per ton, and it is probable that other companies will do likewise. Advices from Cleveland report considerable activity in Ores there.

Pig Iron.—Intimations have been thrown out within the past two or three days of a projected boom, or, in other words, that the owners of furnaces here and points near by intend to make an effort to obtain a sharp advance in price. The market was active and strong the past week, sales of some 10,000 tons having been reported, and a speculative feeling has been developed. It is intimated that some of our capitalists regard Pig Iron as being a good investment, and we should not be surprised to hear of some large sales having been made within the next few days on speculation, provided furnacemen do not get their ideas up too high. The recent sharp advance in Old Rails has had a good deal to do with stiffening Pig Iron. Thus far there have been but few sales at any advance, but we are cognizant of some furnaces having withdrawn all offers to sell at present, while others are sold for several months ahead. While our quotations are based on latest sales reported, some furnacemen are holding off, and, as already intimated, they expect to realize an advance of from \$1 to \$2 per ton before long on present prices. Sales of Bessemer Iron have been made at \$18.50 @ \$19.25, cash. We quote as follows:

No. 1 Gray Forge	\$15.00 @ \$15.25, 4 mos.
No. 2 Gray Forge	14.50 @ 14.50, 4 "
All-Ore Forge	15.75 @ 16.25, 4 "
White and Mottled	12.50 @ 14.00, 4 "
No. 1 Foundry	16.75 @ 17.00, 4 "
No. 2 Foundry	15.00 @ 15.50, 4 "
All-Ore Foundry	18.00 @ 18.50, 4 "
Cold-Blast Charcoal	22.00 @ 23.00, 4 "
Bessemer Iron	18.50 @ 19.25, cash.

Muck Bar.—Continues dull, and is still quoted at \$26 @ \$26.50, cash, at mill.

Manufactured Iron.—There is a continued fair degree of activity; the mills as a rule are still pretty well employed, although there is not as much new business now as there was a few weeks ago. Prices, however, are firmer, in sympathy with the raw material, and unless there is a reaction in the latter the products will have to go higher. We continue to quote prices on a basis of 1.65¢ @ 1.75¢, 60 days, 2% off for cash, for well-assorted orders.

Nails.—The situation here remains unchanged. There appears to be but little prospect of an early termination of the strike. As the case now stands the manufacturers have the best of it, as this is the dull season and there will not be many Nails wanted from now on until the spring trade opens up, as December and January are nearly always dull months. Private advices from the large points of distribution West—Chicago, Milwaukee and St. Louis—report trade dull, with jobbers abundantly able to supply the demand. The secretary of the Western Nail Association reports that the number of machines being run non-union is steadily increasing, and the production is now about equal to the demand. At Wheeling prices are still quoted at \$2.25, 60 days, 2% off for cash, with usual abatement of 10¢ per keg in carlots and upward.

Wrought-Iron Pipe.—The Pipe mills still have all they can do, but there is not as much business offering as there was a few weeks ago; however, manufacturers will be busy until the close of the year, and at present but few, if any, of them can furnish Pipe as fast as it is wanted; natural-gas companies are still hard at work getting Pipe laid as fast as possible, and this will be continued when the weather is at all favorable. Prices firm, but unchanged. Discount on Black Butt-Welded Pipe, in carlots, 45%; less than a carload, 42½%; Galvanized do., in carlots and upward, 35%; less than a carload, 32½%; Black Lap-Welded Pipe, in carlots, 62½%; less than a carload, 60%; do. Galvanized, in carlots, 45%; less, 42½%. Discount on Boiler Tubes, 55%; 2-inch Oil-Well Tubing, 13¢ per foot, net; 5½-inch Casing, 40¢, 8-inch Drive Pipe, \$1.30.

Old Rails.—There have been no transactions in Old Iron Rails reported the past week, in the absence of which we quote nominally at \$21.50 @ \$22. There are but few offering, but it is said that consumers here are pretty well supplied for the present. Old Steel Rails scarce and in demand. No sales reported. May be quoted at \$19 @ \$20, according to lengths.

Merchant Steel.—Trade in cheaper grades continues quite active, and prices firmer, but unchanged. Best brands Refined Cast Steel, 8½¢; do. Crucible Machinery, 4¼¢ @ 4¾¢; do. Open-Hearth and Bessemer, 2½¢ @ 3¢. Bessemer Blooms and Billets are quoted at from \$32 @ \$34. Little or nothing doing in Steel Nail Slabs.

Steel Rails.—Continue firm; sales, it is claimed, have been made at \$35, cash, at mill for Heavy Sections, and \$35.50 is now demanded. The sharp advance in Bessemer Iron has aided in stiffening the Rail market; mills are well sold up and consequently can afford to be stiff, although they nearly all have a good many low-priced orders booked.

Railway Track Supplies.—Spikes are stiff at 2.10¢, 30 days, delivered, and a further advance is not improbable, in sympathy with Old Rails. Splice Bars remain unchanged at 1.65¢ @ 1.75¢, and Track Bolts, 2.75¢ @ 2.85¢.

Old Material.—All kinds of Scrap Steel continue scarce and in demand. In the absence of sales Steel Bloom Ends may be quoted at \$19 @ \$19.50; Steel Rail Ends, \$19.50 @ \$20. It is difficult to quote these correctly in the absence of transactions, as the market is unsettled and irregular. No. 1 Wrought-Iron Scrap is still quoted at \$16 @ \$17, net ton; Wrought Turnings, \$13 @ \$14; Old Car Axles, \$22 @ \$23; Cast Borings, \$10.50 @ \$11, gross ton; Old Car Wheels, \$14.50 @ \$15, gross. One of the largest buyers of Car Wheels reports that they are being offered at \$15.

Window Glass.—Manufacturers continue to quote discounts at 75% on Single and 75 and 10% on Double.

Coke.—Blast-furnace Coke remains unchanged at \$1.20 per ton free on cars at ovens.

Chicago.

Office of The Iron Age, 36 and 38 Clark St., Cor. Lake St., CHICAGO, November 30, 1885.

Hardware.—The closing week in November is never a very good one for business, and last week was no exception to the rule. Trading was considerably lighter than the previous one, but compares favorably with those of other years. Thanksgiving Day was observed by all good citizens, which lessened the number of business days and decreased the activity of the last two days of the week. After making the necessary allowance the week's trade may be summed up as being fair. Colder weather would have improved the demand for some lines, but might have reduced it on others. The call for shelf goods was slightly above the average for the season. Cutlery now comprises a good portion of the orders, while Toys and Novelties are taken by all buyers in a small way. Heavy Hardware and Railroad Supplies have fallen off in demand. Quotations on Iron Spikes have advanced to \$2.10 in carload lots and Carriage Bolts 2½¢, to correspond with the change made by manufacturers. Prices in a general way remain steady for present shipment, but higher figures are predicted for spring trade.

Barb Wire.—In actual transactions the market is very quiet. Jobbers are having scarcely any demand for immediate shipment, and what there is only in small lots for repair purposes from local consumers. Notwithstanding this phase of the market they are required to do a great deal of corresponding on the subject of prices on Wire for spring delivery. The several meetings and incessant talk of manufacturers and jobbers on the subject of forming a pool, the curtailment of supply, the advance in price and the restrictions of unlicensed manufacturers has created a general alarm among dealers and consumers throughout the West. They are now apprehensive that prices may be advanced and that Wire will be difficult to get in the quantity and at the time they may desire it, and for this reason are seeking to get quotations and place their orders for shipments in February and March. Some of the jobbers have pretty fair stocks on hand, and it is possible that considerable Wire has been accumulated by different manufacturers, but as a rule they decline to negotiate sales for future delivery. Among the trade it is generally conceded that the present plan of organization among manufacturers will at least result in some benefit. All are lying in wait to take advantage of what increased price it will bring them. Jobbers in this market are quoting Painted Wire at \$3.50, and Galvanized at \$4.50, but are shading this figure 10¢ in carload lots for immediate shipment. Reports are circulated that Wire has been bought at points along the Missouri River at \$3.25 @ \$3.30 for Painted, and the same ratio of reduction on Galvanized. Who the sellers are has not been stated. It is also reported that, by a decision of the court, unlicensed manufacturers will be permitted to continue making Wire by paying a royalty of 30¢. This, however, being 15¢ above the Washburn & Moen license, handicaps them to such an extent that their business cannot be very profitable.

Nails.—The falling off in the demand is having its influence upon the market. While jobbers continue to name \$3.25 for Iron and \$3.35 for Steel as a nominal quotation, the weakness noted a week ago has become so great that there are undoubtedly more Iron Nails sold at \$3 per keg and Steel Nails at \$3.10 than at the former figure. It is now generally conceded that the last advance made by jobbers was a mistake. While it is true that their profits were short at the time,

the advance was ill-advised, because it was evident that the season was drawing rapidly to a close. With a decline in the demand and the mills in the West gradually improving their position, both by adding workmen to their force and increasing their stocks, they could not expect to sustain the price. It is possible that the change, coming so soon after the advance was made, will find some of the jobbers with greater stocks on hand than are necessary for immediate trade. It is the opinion that Iron Nails can be delivered in this market at \$2.50 @ \$2.75 per keg. When these facts are considered it is presumed that the lower quotation will be pretty firmly adhered to for all trade that is likely to occur before spring trade begins.

American Pig Iron.—The general conditions of the market for the past week were of the same character that has been reported during the entire month. There appears to be a constant hardening of prices, and it is not infrequently that we learn of buyers who are taking Iron at higher prices than those which they refused 30 days ago. Every week serves to convince one more fully of the scarcity of Lake Superior Charcoal Irons. Sales agents report that they have sold lots of Nos. 1, 2 and 3 at \$20, four months, and have made a corresponding advance for Nos. 4, 5 and 6, their quotation being \$20.50. In addition to this we learn of several furnaces who, instead of refusing to make quotations, have changed their price to \$20.50 for Nos. 1, 2 and 3, and \$21 for the balance. Trading in this grade of Iron during the week has largely been in carload lots, though several contracts of 500 tons each have been closed. These sales have been made to cover deliveries for the next three months, and on lots that are under negotiations for delivery previous to July 1 it is said that the latter figure would be a cash price. Trading in Coke Irons has been less active, but prices remain firm at \$18.50 @ \$19 for all Lake Ore Irons. Cinder Mixed continues pretty firm at \$17.50 for the average grade. Ohio Standard Blackbands are unchanged at \$20 for No. 1, and \$18.50 for No. 2. Hocking Valley Irons have been sold in this market at \$18.50. The same Iron several weeks ago was selling at \$17. In some of the brands of Ohio Irons it is said that furnaces refuse to take orders for more than 50-ton lots. Southern No. 1 Foundry continues to be quoted at \$18; No. 2 at \$17; No. 2½, \$16; No. 1 Mill, \$15; No. 2, \$14.50. No large sales of Southern Iron in this market have been reported for the week, but it is rumored that some 20,000 tons were sold to the pipe-makers of St. Louis, Louisville and Cincinnati. If these reports be correct it will so far absorb all the Iron in the hands of Southern furnaces that quotations will be exceedingly firm and possibly advanced within the next 10 days. Reports from nearly all the Southern furnaces selling Iron in this market are to the effect that they have no Iron that they can ship to this territory. This has greatly assisted the makers of some of the Ohio brands in getting better figures.

Merchant Steel.—Jobbers of the best brands report that there is no change in the condition of trade. Their orders continue to be chiefly for small lots, and large buyers are governed principally by quality. Prices continue to be shaded by manufacturers in such an irregular way that there does not appear to be any more definite basis for sales than existed some months ago. Makers of several of the established brands claim that their works are running full; that they are not anxious to obtain further orders unless they can get better prices. It is rumored here that the Gaultier and Linden Steel companies have withdrawn quotations, but whether this is the forerunner of higher prices, or simply the result of being well supplied with orders for winter delivery, remains a question. We renew nominal quotations on High-Grade Tool Steels at 9½¢ @ 13½¢, and 13¢ @ 20¢ for Specials; Ordinary, 8¢ @ 9¢, and Low Grade, 7¢ @ 7½¢; Open-Hearth and Bessemer, 2½¢ @ 3¢; Crucible, 4½¢ @ 5¢; Plow Steel, 5¢ @ 5½¢.

Steel Rails.—The demand for Rails was less active during the past week from buyers who were not previously heard from. A portion of those seeking to place contracts a week ago have closed; others are still figuring on price. Local mills are virtually out of the market, as they have either taken all they can at present or are giving preference to regular customers. Nominal quotations range from \$35 for seconds to \$38 for first quality.

Structural Iron.—Several good-sized contracts were let during the past week, among which was one of 1500 tons of Columns, April delivery, to the Union Foundry Co., and 500 tons of Beams, all for the Marshall Field Building, of this city, which is to be erected as early in the spring as the weather will permit. Considerable trade in a small way from store continues, but nothing of much importance is now in sight.

Plate and Tank Iron.—Trade in small lots during the week was less active than during the early part of the month. The aggregate of business, however, was somewhat larger than for several weeks, caused by the placing of orders for several large lots that have been under negotiations for some time. Of these W. S. Mallory & Co. secured a portion, among which was one lot of 150 tons for January delivery. As there has been no change in quotations announced, we continue the following: Steel Boiler Plate, 3¢ @ 5½¢; Tank Iron, 2.40¢ @ 2.50¢; Flange, do., 4¢ @ 4.10¢; Shell,

do., 3¢ @ 3.10¢; Heavy Sheet Iron, Nos. 10 to 14, 2.50¢; No. 16, 2.75¢; No. 18, 2.85¢.

Bar Iron.—The subject of prices on Old-Rail Iron is getting to be a grave question. The figures which mills are asked to pay for Old Rails, they claim, make it impossible for them to continue selling Finished Iron at prices which have prevailed during the last six months. Jobbers nevertheless contend that they cannot afford to pay mills higher prices, as consumers could get a better class of Iron at even one-tenth more than what they are now paying for this quality. Business for the week has largely been in small lots, and at prices ranging from 1.65¢ to 1.70¢ for Old-Rail Iron. From store New Puddled Iron is held somewhat closer to the quotations—1.80¢ rates—and said to be firm at 1.70¢ rates from mill. Trade has been tolerably active in this grade in small lots. Large jobbers, if such there be, are evidently in no hurry to place contracts, and the chances are that the market will remain quiet from this to the close of the year.

Old Rails.—In the way of demand the market is quite active, but the scarcity of Rails limits transactions to very few sales. Buyers are offering \$19, Chicago, for anything that they can obtain, but holders are of the opinion that prices will still advance further, and are now asking \$20. It seems to be their policy whenever a buyer comes into the market to advance their figures 50¢ @ \$1 per ton, and by this means have led consumers step by step for the last month. The North Chicago Rolling Mill Co. are quoting \$18, Milwaukee. There is no doubt that Rails are scarce, either from those who have them refusing to sell or else stocks have been pretty well taken up, so that the market is depleted of all surplus stock. Steel Rails are in good demand at \$16 @ \$16.50 per ton, buyers making very little distinction as to length.

Black Sheets.—Manufacturers of Black Sheets continue to be rather firm in their price for the season. Jobbers were under the impression that they would be able to buy Iron for less money during November and December, but thus far they have been unable to realize their expectations. Trade from store continues fairly good in small lots, and stocks, as a rule, are in good assortment. Quotations are unchanged as follows: No. 24 at \$3.10; Nos. 25 and 26, \$3.20, and No. 27 at \$3.30.

Galvanized Iron.—Jobbers report the demand from store as fairly good. Cornice-men continue to buy in a small way for finishing up their work, and furnacemen are taking about the same proportion of Iron that they did some weeks ago. In view of the recent change made by manufacturers, jobbers are now quoting 57½¢ off on Juniata and 57 and 10¢ off on Charcoal. On large lots these prices would be shaded perhaps 5 @ 10 ¢.

Old Wheels.—There is no special activity in the market. Buyers can be had at almost any time who will take 50 to 100 tons, but they are not anxious to purchase at present prices. Holders continue to ask \$14.25, cash, or \$14.50, 30 days, and are apparently indifferent about selling at these figures. While Wheels are regarded as scarce, stocks are considerably larger than is generally known, and a great many sales could be effected at \$13.75 @ \$14, but buyers are unwilling to go beyond these prices.

Scrap Iron.—Dealers report an active demand for No. 1 Forge Scrap, and make quotations on a basis of \$16.50 @ \$17. These prices are perhaps 50¢ a ton higher than mills willingly pay, but as stock is not overabundant they are frequently compelled to meet sellers' prices. Quotations on No. 1 Mill continue to be \$13.50 @ \$14, and on No. 2, \$8.50 @ \$9. We make the following quotations as dealers' purchasing prices: No. 1 Wrought, \$13; Machinery, \$12; Stove Plate, \$7.50; Steel Tires and Wagon Springs, \$12.50; Old Plows and Plow Steel, \$9; Wrought-Iron Turnings, \$8.50; Cast-Iron Boring, \$7.50; Malleable Scrap, \$6.

Pig Lead.—The market developed unexpected strength last week, and prices made an unusual advance within so short a period. The scarcity of Lead is ascribed as the reason for the advance, but upon closely sifting the facts it will probably be discovered that this scarcity is the result of manipulation by speculators, who are working in concert with several of the largest refiners. While it is true that one company have curtailed their production, there is no foundation for the impression that Lead is scarce enough to force prices up 25¢ in the space of a few days, and that, too, just at the beginning of consumers' duldest season. Sales reported for the week aggregate about 1000 tons. These were made at figures ranging from \$4.05 to \$4.20, the market closing at the latter figure on Saturday. To-day \$4.25 is asked for Spot Lead. Consumers are not anticipating their wants.

Chattanooga.

Office of The Iron Age, Carter and Ninth Sts., CHATTANOOGA, November 30, 1885.

Nothing particular to note beyond the rather anomalous condition for this time of year that the trade in dry goods and groceries is dull, while all lines of Heavy Hardware and Pig Iron are brisk. Wet weather still continues quite general throughout the South, which will, of course, greatly curtail the aggregate yield of cotton. Collections from the country are, on the

whole, coming in quite satisfactorily. Money is getting easier from day to day, and many local stocks both in railroads and manufacturing enterprises have advanced materially within the past two or three weeks. The railroads at the present time are simply overloaded with freight and are not able to promptly respond to what is required of them. Instances occur where two and three weeks are required to get cars to move what is offered. Pig Iron, cotton, lumber and Agricultural Implements are among the principal items now transported, of which lumber to the North forms a large part.

Pig Iron.—Producers of this article are now assuming quite an independent position in regard to making sales. Taking the present price of Pig as having advanced, say, \$1 per ton above the low figure of last summer, there are furnaces who have refused to make contracts for their entire product for the coming year at this advance, and prefer to retail their output at present prices, which they have no trouble in doing. They are firmly of the opinion that prices will still advance, and from the correspondence that they are daily receiving from the North appear to be fully justified in this opinion. The East is taking their full share of the output of the Southern furnaces. By the first of the coming month nearly 8000 tons will have gone into that market. From inquiries received from that quarter No. 2 Foundry appears to be the favorite grade there and meets with ready sale. The furnaces that are running are all doing well, increasing in quantity, as well as turning out a better quality. The Chattanooga Furnace, constructed for a 30-ton capacity, went into blast a few days since and has already reached a daily output of 70 tons. A number of furnaces that hitherto were obstinate on turning out Gray Forge have now turned on to Foundry to such an extent that their owners have difficulty in filling their orders for Forge Iron. From the South the orders are holding up remarkably well for the time of year.

Hardware.—Business is brisk, and such has been the increase through the South as to warrant the establishment of wholesale houses especially for this class of goods who will ignore the retail trade entirely and confine themselves wholly to the wholesale trade. Hitherto much wholesaling has been done by houses which have also done a retail business, but strictly retail merchants have not looked upon such concerns with the favor that they would have done if they had confined themselves to a wholesale business, and many times have passed them by and purchased their goods in New York and other large trade centers.

Cast Pipe.—The demand is increasing and the works are simply unable to respond to inquiries, and orders are far ahead. Prices have advanced \$2 @ \$3.

Miscellaneous.—It is expected that this city will make a creditable exhibit at the Exposition at New Orleans the coming winter; 24 of the 37 manufacturing concerns here have entered their names as exhibitors, and the Queen and Crescent Line have agreed to take everything down to New Orleans and return the same free of charge. A collective exhibit will probably be made that will be creditable. The passenger incline from the foot of Lookout Mountain to the top is progressing very fast. The grading is nearly done, and the engineer expects to have everything in readiness by the 1st of May next for the transportation of passengers from the end of the railroad that runs to the foot of the mountain to the top. When this is completed it will be but a matter of 20 or 30 minutes from the city to the top of the mountain. The engineer is Major King, of the United States Engineer Corps.

Birmingham.

BIRMINGHAM, Ala., November 30, 1885.

As a general thing merchandising is still quite unsatisfactory throughout this region. Hardly anybody, indeed, but manufacturers seems contented with his sales. As for Birmingham particularly, there has been one failure here in the last week, though it is noteworthy mainly for the contrast with the fortunes of the merchants here generally. The latter, even before the depression of last spring and summer, were understood to have something less than the average capital for a town of the size of this, but they have weathered the hard times in a way that has elicited many expressions of surprise, and, if anything, there are fewer "shaky" shopkeepers here now than ever before. The drummers who come here, however, predict an increased ratio of failures here as well as everywhere else in this part of the country during the winter. Iron, no matter in what shape, seems to sell better than anything else.

Pig Iron.—The furnaces hereabouts that are not out of the market are booking new business every day. In some cases, though, the orders ahead aggregate less now than they did a few weeks back, the principal cause, no doubt, being a growing dissatisfaction with present prices on the part of the manufacturers. One 6000-ton contract for delivery after the 1st of January at \$1 more than the price that governed recently was certainly declined here a few days ago. The furnaces that have sold their whole product ahead report that they are constantly having to decline new business. Two furnaces are making hardly anything but Foundry Irons, and at one of these a few days ago, for the

second time, the writer was present just after a solid cast of No. 1 Foundry had been made. Altogether the state of the trade is such as to make the sluggishness of prices more anomalous than ever. The 1st of December returns will show a considerable reduction of stocks in this district even in the last 30 days, and indications of the same state of things come here from everywhere else. Why, then, are not prices higher, is a question on which much talk may be heard, and on which there is some diversity of opinion.

Nails.—The Alabama mills, with a good volume of orders booked, are still quoting Nails at \$3, and they still come a little cheaper to the dealers here from more distant points.

Cast Pipe.—Is selling briskly at \$27.50 @ \$30 still, but with premonitions of another advance.

Coal.—Grate Coal still sells freely, while the demand for Steam Fuel has not improved much.

Miscellaneous.—Business is fair at all the foundries and shops here. The Pratt Coal and Iron Co. are keeping the Linn Works engaged on their furnaces almost exclusively, and this fact inspires new confidence in the idea that they wish the plant for their own use and not to sell. R. W. Boland got one of the best contracts that came here last week. It is for some \$1200 worth of jailwork for Blount County, this State.

Cincinnati.

NOVEMBER 30, 1885.

Pig Iron.—But little change, if any, is reported in the market from a week ago. The rolling mills are not in the market to any considerable extent. The jobbing and machine foundries continue to draw supplies as they are needed, mostly of the Nos. 1 and 2 grades. It is thought that this condition of things will last into the coming year; it is, however, being developed that the Pipe foundries throughout the West and South have already booked orders for deliveries covering several months to come, and that other orders are being offered—enough to cover the entire capacity of all the Pipe foundries in the regions named. If this proves to be the case, the quantity of Pig Iron required will absorb the entire production of the Southern furnaces of the No. 2 and Open Mill grades. It is reported to-day that one round lot of Mill Iron has been sold for spot delivery at a price equal to \$14.25, cash, in Cincinnati. This condition of the trade is having a decided tendency to stiffen the market for all grades. Prices quoted below are f.o.b. here, or less the freight to Cincinnati if orders are filled from furnaces direct; 50¢ discount per ton from time prices for cash:

CHARCOAL FOUNDRY.		
Southern No. 1, 4 mos.	\$17.50 @	\$18.50
Southern No. 2, 4 mos.	17.00 @	17.50
Hanging Rock, Best, No. 1, 4 mos.	20.00 @	20.50
Hanging Rock, Good, No. 1, 4 mos.	19.00 @	19.50
COKE FOUNDRY.		
Ohio and West Pennsylvania, No. 1, 4 mos.	16.75 @	18.50
Ohio and West Pennsylvania, No. 2, 4 mos.	15.75 @	17.50
Southern No. 1, 4 mos.	16.50 @	17.50
Southern No. 2, 4 mos.	15.75 @	16.50
SILVER-GRAY SOFTENERS.		
Hanging Rock (Jackson County), No. 1, 4 mos.	16.50 @	17.00
Hanging Rock (Jackson County), No. 2, 4 mos.	15.50 @	16.00
Hanging Rock (Jackson County), No. 3, 4 mos.	14.50 @	15.50
Other makes and grades.	13.50 @	15.50
CAR WHEEL.		
Hanging Rock Cold-Blast, 4 mos.	25.00 @	26.00
Hanging Rock Warm-Blast, 4 mos.	18.50 @	22.00
Georgia Cold-Blast, 4 mos.	25.00 @	26.00
Alabama, Georgia and Tennessee Warm Blast.	17.00 @	18.00
Alabama, Georgia and Tennessee Warm Blast, Standard.	22.00 @	25.00
FORGE.		
Range of kinds, cash.	12.50 @	14.50
SCRAP.		
Rails, per ton.	17.50 @	18.50
Wheels.	14.00 @	14.50
Wrought, per 100 lb.	1.0 @	.70
Cast, per 100 lb.	.80 @	.60

Louisville.

W. B. BELKNAP & Co., Louisville, under date of November 30, report as follows: The dullness usually characteristic of the close of the calendar year in the Iron and Hardware business seems bound to put in an appearance, if only to follow precedent. Trade for the past week, though very fair for the season, exhibits an inclination to gradually taper off. Vulcan advocates in favor of St. Nicholas, and only those whose goods go legitimately to furnish the attractive Christmas counter can reasonably expect to have a busy time. There is every confidence, however, that the early part of 1886 will find manufacturers bent on higher prices, not such as to scare the consumers off, but to realize at least a profit instead of a loss on goods. Everybody is sick of the long depression which hangs around the neck of Commerce like a millstone, and the revulsion of feeling is in favor of the market, if nothing else. The death of the Vice-President is used as a bear argument by some, but if the country can stand a change of administration without a shock it will be hard to persuade people that the death of a single individual will seriously disturb it. The weather has been fine and open and not severe in any particular, so that outdoor work, building, &c., has progressed uninterrupted up to the present time, and the amount of such work in our own city is, to say the least, encouraging. The proposed change of gauge from 5 feet to the standard Northern gauge by the Louisville and Nashville Railroad throughout its entire system is a matter of interest in railroad circles here, and it will do away with the hoists and other expensive changes incident to a double gauge. The change is to take place some time the coming spring, and the supplies

therefor have already been purchased. "Bar Iron"—Is firmly pegged at the present prices. An advance seems improbable, as the demand for immediate use is not strong. A decline is just as improbable, as there is no give to the price; the elasticity has been pounded out of it long ago. **Hoops and Bands.**—The manufacturers who make specials of these are adhering right firmly to an almost uniform price. The demand for Cut Hoops has been good this season, as many of the distilleries have been steadily at work. **Sheet.**—The light gauges of Sheet have continued to weaken in price. We have rarely seen the market more suddenly or more adversely affected than in the matter of Light Sheet after the mills yielded to the rollers' scale and began to run. The heavy gauges held their own with stubborn persistency. **Steel.**—Cast Steel is juggling in fair quantities. There is a little more activity in Tire, Spring and Machinery Steel, incident to the announced fact of an advance shortly to be made by all of the manufacturers. The full benefit of this, however, will not be immediately reaped, as pointers have been freely given. **Nails.**—The market is a trifle easier, owing to the falling off in demand in the Northwest, where winter has set in and consumption is accordingly affected. The advance in west-bound freights, however, is doing a good deal to keep Eastern Nails out, so that retrogression, if such it may be called, is very gradual. There is no extra supply here yet, nor any immediate promise of such. Some of the leading sizes are entirely wanting, and the only way jobbers have survived the scarcity was by good-natured exchange among themselves. This has served to reduce assortments to the minimum. But buying cannot be expected on any liberal scale until the market has settled down to its legitimate figure after the mills start. We are just advised of an advance of ½¢ on Wrought Spikes, both railroad and boat, by the manufacturers. There is a good demand for this class of goods, and we understand the combination is a very strong one. **Wire.**—The advance on Wire so far has been a matter of assurance, and not one of realization. Whatever be the motive, certain of the manufacturers, particularly the unlicensed, seem anxious to get rid of their stock at extraordinary figures. It would be well, however, if consumers or jobbers who buy much of this cheap Wire would weigh the reels and arrive at the shortage. In some cases that fell under our own observation lately the whole package, reel and Wire, hardly weighed as much as the net weight of the Wire marked thereon. In some instances the reels tared at 5 lb.; actual weight 7 lb., and so on. The net profit of 5 or 6 lb. of Wire per reel is a good margin in itself. Those who can secure it have, of course, an advantage over those who will give full weight. Complaint as to quality has become more frequent since the prevalence of low prices. We think all would be willing and glad to pay more for a first-rate article. **Plain Wire** is firmly upheld by the manufacturers, and if they can adhere to present figures long it must necessarily tell on the Bar-Wire market. It is more than 30 days, however, until the 1st of January, and a great many notes may fall due between now and then.

The condition of the country is not discouraging, and we doubt if the wheat crop throughout Kentucky and Tennessee ever gave better promise at this stage.

GEORGE H. HULL & Co., of Louisville, report to us as follows, under date of November 30: **Pig Iron.**—The market for Pig Iron is much stronger than last week, and Mill Irons have advanced. Probably several thousand tons more Mill Iron could be sold if furnaces would book the orders, but many of them are sold so far ahead they will not book any more orders. Other grades are sympathizing to some extent in the advance, but the strongest position is held by mill grades. We quote for cash in round lots as below:

PIG IRON.		
Southern Coke, No. 1 Foundry.	\$16.00 @	\$17.00
" " No. 2	15.25 @	16.00
" " No. 2½	14.50 @	14.75
Hanging Rock Coke, No. 1 Foundry.	16.00 @	16.50
Hanging Rock Charcoal, No. 1 Foundry.	19.00 @	20.00
Southern Charcoal, No. 1 Foundry.	17.50 @	18.50
Silver Gray, different grades.	14.50 @	15.50
Southern Coke, No. 1 Mill, Neutral	14.00 @	14.50
" " No. 2	13.50 @	13.75
" " No. 1 Cold Short	13.75 @	14.10
Southern Charcoal, No. 1 Mill.	15.50 @	16.50
White and Mottled, different grades	11.50 @	12.50
Southern Car-Wheel, standard brands.	22.00 @	23.00
Southern Car-Wheel, other brands.	17.00 @	18.00
Hanging Rock, Cold-blast.	25.00 @	28.00
" " Warm-blast.	17.00 @	18.00

St. Louis.

W. H. SHIELDS, 305 Olive street, St. Louis, reports, under date of November 30: Prices have advanced from \$1 to \$1.50 per ton. The demand for Bessemer and Mill grades is good, but there is not much inquiry for strictly Foundry Irons at the advanced price. The impression here seems to be that the advance will not be great, and will hardly be maintained for any length of time.

CHARCOAL FOUNDRY.		
Missouri.	\$15.00 @	\$17.00
Southern.	15.00 @	17.00
COAL AND COKE FOUNDRY.		
Missouri.	15.00 @	17.00
Southern.	15.00 @	17.00
American Scotch.	17.00 @	17.00
MILL IRON.		
Missouri.	14.25 @	14.50
Southern.	14.25 @	14.50
CAR-WHEEL AND MALLEABLE.		
Southern.	20.00 @	24.00
Lake Superior.	20.00 @	23.00
SCRAP, ETC.		
Old Rails.	19.00 @	30.00
Old Wheels.	14.00 @	14.25
Connellsville Coke (East St. Louis).	5.30 @	5.00

The British steamer Miranda sailed from this port on Monday with 126,000 stand of arms, the balance due under a contract for 600,000 made with the Turkish Government by the Providence Tool Co. some years ago. Their destination is said to be Constantinople. Default being made in the payment, the arms were held in store by Drexel, Morgan & Co., who made advances, and then transferred to a bank in Providence, R. I.

Trade Report.

General Hardware.

The past week has been uneventful, there being comparatively few changes in price, and the volume of trade continuing moderate. The market is, however, regarded as in a fairly satisfactory condition, and the outlook is regarded hopefully.

NAILS.

The advance in freights from Eastern mills to Western distributing centers has had the effect of cutting off a part of the trade in that direction, and has led to the appearance of sellers in this market who have not been in it for some time. The agents of different mills are getting a better assortment, although there are frequent instances where top prices must be paid for immediate delivery. Buyers in a large way are holding off, waiting till a more abundant supply holds out the promise of easier terms. For carload lots on dock, early shipment, we quote \$2.50. From store quotations fluctuate between \$2.60 and \$2.70, according to urgency of buyer, assortment, &c.

BARB WIRE.

It is reported that for Southern shipment inquiries are more numerous. Some of the works have booked largely for that territory, and are disposed to assume a firmer attitude. Local sales are small. Plain Market Wire was advanced last week by the association to 2.95 cents for Bright and \$3.70 for Galvanized, and it is stated that even at those figures some of the wire mills are loth to book large orders. It is asserted that this advance in the raw material for Barb Wire cannot but have its effect upon it. Still, we hear of low offers, and quote Four-Point Galvanized, in carload lots, at 4.25 cents to 4.35 cents, with the usual difference for small lots. Lately there has been a sharp competition for the export trade, and very low figures have been named. Quotations are now higher, however.

FILES.

We give in another part of this page a revised price list of Files and Rasps adopted at a meeting of the File Manufacturers' Association of the United States, held in this city, November 20, and which went into effect yesterday, December 1. It will be seen on comparing this list with the former one that it has been subjected to a thorough revision, while many of the leading sizes of Files remain without material alteration. It will be observed that the list price of odd sizes has been generally advanced, and that the list on Horse Rasps has been so changed as to make them subject to the same discount as Files. The convenience of this modification and the consequent uniformity of discount will be appreciated by the trade. This list will unquestionably become the standard list, having been already adopted by the principal manufacturers.

The Nicholson File Co., Providence, R. I., issue the list, with a circular referring to it as adopted by them in lieu of their list of June 1, 1883. The list prices of their Patent Double-Enders, Racer Horse Rasps, &c., are given as follows:

Patent Racer Brand of Horse Rasps, same price as Horse Rasps.
Patent Double-Enders Saw Files—No. 7, \$2.55; No. 8, \$2.80; No. 9, \$3.15; No. 10, \$3.70—per dozen.
Stave Saw, single cut, regular, \$5.50; Improved, \$7—per dozen.

They also state that the discounts last quoted will hereafter apply to the new list instead of the old, and will for the present remain unchanged, except upon Horse Rasps, which, instead of being 55 per cent. discount, from the old list, will be 60 per cent. discount from the new list.

AMMUNITION.

The Ammunition Manufacturers' Association, which have for some time been endeavoring to formulate and carry into effect a plan for the satisfactory regulation of the price of their goods, regard the work as substantially accomplished. The outlines of the plan are indicated in the following letter to Mr. Taylor, the commissioner.

New York, December 1, 1885.

We take pleasure in enclosing to you an agreement in duplicate, which, after careful examination, we trust will meet your hearty co-operation and approval. Some of the important features of this agreement are that, in making the houses whom we designate as "specials," partial distributors of goods of our manufacture, we remove the competition between you and them, which has heretofore existed to such an extent as to make the handling of ammunition at times unprofitable. It makes but one selling price for goods, whether sold by the manufacturer, the special or the A. dealer. It secures to you the same profit as to the special. It prevents the advertising of goods at the lowest selling prices, thereby giving the entire trade an opportunity of securing a larger profit than they could do if not restricted. The rebate clause provides what we believe to be a sufficient guarantee that all who adopt this plan with us will faithfully carry out their contract. If you accept, please sign and return one copy of the agreement promptly. Yours truly,

CHAS. TAYLOR,
Commissioner.

The arrangements which are thus indicated and which are specifically referred to in the agreement which is being sent out to the jobbing trade for their approval and signatures provide, as referred to above, for

a quarterly rebate which shall be given to the jobbers who are parties to the agreement, provided that its terms and conditions are by them faithfully adhered to. It is the aim of the plan to secure uniformity in price, freight taken into consideration, so that, the price in New York City below which the goods are not to be sold being made the basis, the extreme selling price at Chicago, St. Louis and other specified points shall be such New York price with the freight added; such extreme selling price at these points being specified by the association in the form of a discount less than the New York discount in proportion to the freight. The special dealers referred to in the preceding circular letter are the following:

HIBBARD, SPENCER, BARTLETT & Co., Chicago, Ill.

E. C. MEACHAM ARMS CO., St. Louis, Mo.

SIMMONS HARDWARE CO., St. Louis, Mo.

E. K. TRYON, JR., & Co., Philadelphia, Pa.

JOSEPH C. GRUBB & Co., Philadelphia, Pa.

HARTLEY & GRAHAM, agents for the Union Metallic Cartridge Co., New York City.

WALLACE & SONS, agents for the United States Cartridge Co., New York City.

MERWIN, HULBERT & Co., agents for the American Metallic Cartridge Co., New York City.

LAMBERSON, FURMAN & Co., New York City and Chicago.

JOHN P. MOORE'S SONS, New York City.

SCHOVERLING, DALY & GALES, New York City.

H. & D. FOLSOM, New York City.

HERMANN BOKER & Co., New York City.

JOHN P. LOVELL'S SONS, Boston, Mass.

WILLIAM READE & SONS, Boston, Mass.

It is, however, to be borne in mind that it is explicitly stated that the jobbing houses to whom these circulars are sent are to secure the same profit as the special distributors above named, and that there is to be one selling price for the goods, whether sold by the manufacturer, the special or the A. dealer, the special dealers, some of whom have been known to disturb the market by their irregular quotations, being subject to precisely the same restrictions as to selling prices as other jobbers. It is understood that these special dealers accept the plan as proposed, and it is hoped that it will result in checking the competition which has been so animated among them. There are other points covered by the agreements which are being sent out, but we have alluded to those most important in their general bearings. These agreements are now being placed in the hands of the parties who are regarded as entitled to the benefit of their provisions. It is expected, as the plan has been carefully considered and matured after consultation with the representative houses in the trade, that it will be promptly accepted, and result in giving regularity again, for a time at least, to a line of goods which have of late been exceedingly troublesome.

DAVID MAYDOLE & CO.,

Norwich, N. Y., issue, December 1, the following revised price list for David Maydole's Cast Steel Hammers. In sending it out they call attention to the considerable reduction in price of their Blacksmiths', Carriage Joiners', Engineers', Machinists' and Coopers' Hammers. They state also that their discounts have been changed, and apply to the entire list, and announce 25 per cent. discount on purchases amounting to \$200 in six months. The list is as follows:

Adze-Eye Hammers.			
No.	Price per doz.	Weight each.	D. oz.
1.	\$8.00	1-4	1-4
2.	6.00	1-3	1-3
3.	5.00	1-2	1-2
Adze-Eye Bell-Face Hammers.			
11.	\$8.00	1-3	1-3
11½.	7.00	1-0	1-0
12.	6.00	1-0	1-0
18.	5.00	7	7
Joiners' Hammers.			
20 (Box).	\$6.50	1-8	1-8
21.	5.00	1-2	1-2
21½.	4.50	15	15
22.	4.00	12	12
23 (Brad).	3.50	12	12
Joiners' Bell-Face Hammers.			
31.	\$5.00	1-1	1-1
31½.	4.50	14	14
32.	4.00	11	11
33.	3.50	7	7
Farriers' Hammers.			
51, Adze-Eye.	\$6.00	10	10
52, Adze-Eye.	5.00	8	8
53, Plain.	3.50	7	7
Riveting Hammers.			
40.	\$6.00	1-8	1-8
41.	5.00	1-2	1-2
42.	4.50	15	15
43.	4.00	12	12
44.	3.00	7	7
Blacksmiths' Hand Hammers.			
61.	\$11.00	3-0	3-0
62.	10.00	2-10	2-10
63 (Shoulder Pein).	11.00	2-14	2-14
Carriage Ironers' Hand Hammers.			
111.	\$12.00	2-12	2-12
112.	11.00	2-6	2-6
Engineers' Hammers.			
91, Riveting Pein.	\$9.00	2-4	2-4
92, Riveting Pein.	8.00	1-12	1-12
93, Ball Pein.	10.50	2-0	2-0
94, Ball Pein.	9.00	1-9	1-9
95, Ball Pein.	8.00	1-2	1-2
Machinists' Ball Pein Hammers.			
Round.			
70.	\$15.00	3-0	3-0
70½.	13.00	2-4	2-4
71.	11.50	1-14	1-14
72.	10.50	1-8	1-8
73.	9.50	1-4	1-4
74.	9.00	1-0	1-0
75.	8.50	12	12
76.	8.00	10	10
77.	7.00	7	7
Octagon.			
130.	\$15.00	3-0	3-0
131.	13.00	2-4	2-4
132.	11.50	1-14	1-14
133.	10.50	1-8	1-8
134.	9.50	1-4	1-4
135.	9.00	1-0	1-0
136.	8.50	12	12
137.	8.00	10	10
138.	7.00	7	7

Price List of Files and Rasps.

December 1, 1885.

MILL AND ROUND.				FLAT AND SQUARE.				HAND, WARDING AND PILLAR.				HALF ROUND OR THREE SQUARE.			
Inch.	Bastard.	2d cut.	Smooth.	Inch.	Bastard.	2d cut.	Smooth.	Inch.	Bastard.	2d cut.	Smooth.	Inch.	Bastard.	2d cut.	Smooth.
4	\$1.80	\$2.15	\$2.40	4	\$2.00	\$2.40	\$2.65	4	\$2.25	\$2.70	\$3.00	4	\$2.50	\$3.00	\$3.30
5	2.00	2.40	2.65	5	2.20	2.60	2.90	5	2.50	3.00	3.30	5	2.80	3.35	3.70
6	2.25	2.65	2.95	6	2.50	2.95	3.25	6	2.80	3.30	3.65	6	3.20	3.80	4.15
7	2.55	3.00	3.30	7	2.90	3.40	3.75	7	3.20	3.75	4.15	7	3.70	4.35	4.80
8	2.90	3.40	3.70	8	3.40	4.00	4.35	8	3.70	4.35	4.75	8	4.30	5.00	5.50
9	3.30	3.85	4.20	9	4.00	4.70	5.10	9	4.35	5.10	5.55	9	5.00	5.85	6.40
10	3.80	4.40	4.80	10	4.70	5.45	5.90	10	5.20	6.00	6.55	10	5.80	6.75	7.30
11	4.50	5.20	5.65	11	5.60	6.50	7.05	11	6.30	7.30	7.95	11	6.70	7.75	8.40
12	5.40	6.20	6.75	12	6.70	7.70	8.40	12	7.50	8.60	9.40	12	7.80	9.00	9.75
13	6.50	7.45	8.05	13	8.00	9.15	10.00	13	8.90	10.20	11.00	13	9.10	10.40	11.25
14	7.80	8.90	9.65	14	9.50	10.90	11.80	14	10.50	12.00	13.00	14	10.60	12.10	13.10
15	9.30	10.60	11.45	15	11.20	12.75	13.75	15	12.30	14.00	15.10	15	12.40	14.15	15.25
16	11.00	12.50	13.40	16	13.10	14.85	16.00	16	14.30	16.20	17.30	16	14.50	16.50	17.70
17	12.90	14.60	15.60	17	15.25	17.25	18.45	17	16.60	18.75	20.10	17	16.90	19.10	20.50
18	15.10	16.90	18.10	18	17.65	19.75	21.20	18	19.20	21.50	23.00	18	19.60	22.00	23.50
19	17.60	19.70	21.10	19	20.30	22.75	24.35	19	22.10	24.75	26.50	19	22.60	25.30	27.10
20	20.40	22.85	24.50	20	23.20	26.00	27.85	20	25.30	28.35	30.35	20	26.00	29.10	31.20

Extras.

Mill Double Cut, advance 1 in.
Mill Narrow Points, advance 1 in.
Cross Cut Blunt, advance 1 in.

Extras.

Cant Blunt (D'ble Cut), adv. 2 in.
Ginsaw (Saw) take Bastard price.
Slotting (Blunt), advance 2 in.

Extras.

Knife, advance 1 in.
High Back Hlf. Rd. (Bl't), adv. 2 in.
Cross (Blunt), advance 2 in.
Feather Edge (Blunt), adv. 2 in.

Inch.	3	3½	4	4½	5	5½	6	7	8	9	10	11	12	13	14
Tapers, Single Cut.	1.10	1.10	1.20	1.40	1.70	2.00	2.40	3.00	3.80	4.60	5.70	7.20	9.00	11.00	13.20
Tapers, Double Cut.	1.60	1.60	1.75	2.00	2.40	2.75	3.25	4.00	4.95	5.99	7.10	8.80	10.80	12.90	15.20
Slim Tapers, Single Cut.	1.20	1.20	1.30	1.45	1.70	1.90	2.10	2.50	3.00	3.70	4.50	5.50	6.80	8.30	10.00
Slim Tapers, Double Cut.	1.80	1.80	1.90	2.10	2.40	2.60	2.85	3.30	3.90	4.70	5.60	6.75	8.20	9.75	11.50
Pit-Saw Blunt, Single Cut.	2.10	2.10	2.20	2.30	2.50	2.80	3.20	3.70	4.30	5.00	5.80	6.70	7.70	8.80	10.00
Hooktooth Blunt, Single Cut.	.....	.....	.....	.....	.....	.....	3.60	3.90	4.40	5.10	6.00	7.10	8.40	.....	.....

Extras.

Band-Saw, Heavy, Blunt, take Taper Double Cut price; Taper Points same price. Band-Saw, Light, Blunt, take Slim Taper Double Cut Price; Taper Points same price.
Cant-Saw, Blunt, Single Cut, take Pit-Saw price. Round Gulleting, Blunt, Single Cut, take Pit-Saw price.
Round Off, Blunt, Single Cut, take Hooktooth price.
Reversible Tapers, double the price of Slim Tapers of half their length.

Inch.	6	7	8	9	10	11	12	13	14	15	16	17	18
Horse Rasps, Plain.	.....	.....	.....	.....	6.50	7.50	9.00	10.70	12.70	15.00	17.60	20.50	23.70
Horse Rasps, Beveled and ¼ Rasp.	.....	.....	.....	.....	7.20	8.30	10.00	11.80	14.00	16.50	19.40	22.50	26.00
Horse Rasps, Tanged.	.....	.....	.....	.....	9.00	10.25	12.00	14.00	16.50	19.50	23.00	.....	.....
Wood Rasps, Half Round and Flat.	4.20	5.00	6.10	7.30	8.75	10.40	12.30	14.50	16.90	19.60	22.50	.....	.....
Cabinet Rasps.	6.00	7.00	8.20	9.60	11.20	13.00	15.00	17.20	19.60	22.20	25.00	.....	.....
Cabinet Files.	4.20	5.00	6.10	7.30	8.75	10.40	12.30	14.50	16.90	19.60	22.50	.....	.....
Shoe Rasps, Half Round and Flat.	4.60	5.30	6.10	7.00	8.00	9.10	10.30	11.60	13.00	.....	.....	.....	.....
Shoe Rasps, Oval.	5.30	6.10	7.00	8.00	9.10	10.30	11.60	.....	.....	.....	.....	.....	.....

Extras.

File Rasps, Flat and Half Round, take Flat and Half Round Wood Rasp Price.
Wood Files, Flat and Half Round, take Flat and Half Round Bastard price. Last Makers' Rasps, price of Cabinet.

Extras (General).

One Round Edge, advance 7½ per cent., and Two Round Edges, 15 per cent., on respective kinds and Cuts.
Blunt Files, not specified, advance 1 inch on respective kinds and Cuts. Dead Smooth, double the Price of Bastard Cut.
Equalings (Bellied), advance 2 inches on respective kinds and cuts.
Sizes below 4 inches, not extended, take 4-inch price; ½-inch, not specified, take next higher full-inch price.
Rough, Coarse, Union Cut, Brass, or other than regular cuts (not specified), made upon regular or standard-shaped blanks, advance 1 inch on respective kinds and cuts.
Single or Float Cut (not specified), on regular shapes, take double cut price.
Irregular Goods.—All lengths above those listed, and Files varying from standard sizes, to be classed as irregular and subject to special prices.

Machinists' Chipping Hammers.

100	\$10.00	1-12
101	9.50	1-6
102	9.00	1-2
103	8.50	12

Coopers' Hammers.

130	\$1
-----	-----

THE ARRANGEMENT OF HARDWARE STORES.

We are in receipt of many letters from the trade on this subject, indicating the interest with which the discussion is regarded, acknowledging the need there is in many stores for better order and more effective and business like methods, and giving suggestions which are in most cases definite and practical. These letters we will refer to from week to week, and give our readers the substance of such suggestions as may be of service to them. In the meantime we shall be pleased to have criticisms on plans and methods presented, and additional suggestions concerning the general arrangement of Hardware stores, or concerning the best way of handling special kinds of goods.

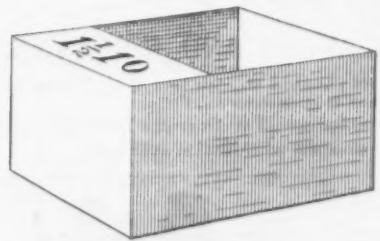
The following letter makes a point in regard to this subject, to which we earnestly direct the attention of our readers. Many of the plans submitted have been for large stores with complete equipments, representing a class of trade considerably above the average. We do not desire to pass over the arrangement of stores of this size and completeness, and we trust that our correspondents will write us freely in regard to them. But, as by far the larger proportion of stores in the country do a business not exceeding \$15,000 or \$20,000 per annum, we shall especially value suggestions with reference to the arrangement of such stores. At the same time our readers will bear in mind that the plans which are submitted by our correspondents are not intended to be adopted as a whole, but rather to furnish information as to methods which are found desirable and which with modifications may be adopted elsewhere. We do not suppose that many of our readers will imitate closely any given plan, or follow any described arrangement, but from all the suggestions which are made they will probably gather points which may be of service. The correspondent we have referred to says:

I notice you invite correspondence on the best manner of arranging a Hardware store, size of room, &c., and I have been very much interested in the letters you publish. They all seem to advance very good ideas. It is an easy matter to arrange a stock of goods satisfactorily if you have a room 100 feet long or more by 20 to 25 feet wide, but will you please ask your correspondents to tell us how to arrange a store 50 feet long by 20 feet wide to do a business of \$40,000 to \$50,000 per year?

We leave our correspondent's inquiry with our readers, and shall be glad to hear from them in regard to the matter. Some of them will be able to give suggestions for even a smaller store than is mentioned above, and one doing a considerably smaller business.

Larrabee & Barnes, Amsterdam, N. Y., send us the following communication describing the method they have adopted for keeping their Screws, and which, as not generally used, may be of interest to our readers. They say:

In regard to the arrangement of Screws for retail we believe the simplest way is the best. We have had made, and have used for more than a year, tin boxes, the numbers and sizes of which are given below, large enough to hold one or more gross each size of Screws. The form and construction of these boxes are shown in the accompanying cut. These boxes are placed in a drawer near the doing-up counter, in order to have them within convenient reach when wanted. It would perhaps be better if room could be spared to keep them on the wide shelf over the drawers usually found in Hardware stores, so that the numbers could be more readily seen and the Screws be more accessible. Sometimes it is very convenient to take one of these boxes out on the counter, which can be done easily, and each box being numbered, the desired size can be seen at a glance, thus saving the numerous still-hunts we used to have when we kept our Screws in the original paper packages. Care should be taken to have the boxes made strong. While this



Tin Box for Screws.

plan is not original with us we have found it satisfactory, and give the dimensions of our boxes, which may be of service to some of our readers. It is to be noticed that there is an even number of each size:

20 Boxes 3 inches long, 2 1/4 inches wide, 1 3/4 inches deep, for 1/4 Nos. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12; 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 3/4 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 1 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 1 1/4 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 1 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 1 3/4 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 2 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 3 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 3 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 4 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 4 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 5 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 5 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 6 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 6 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 7 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 7 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 8 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 8 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 9 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 9 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 10 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 10 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 11 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 11 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 12 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 12 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 13 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 13 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 14 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 14 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 15 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 15 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 16 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 16 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 17 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 17 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 18 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 18 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 19 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 19 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 20 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 20 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 21 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 21 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 22 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 22 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 23 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 23 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 24 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 24 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 25 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 25 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 26 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 26 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 27 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 27 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 28 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 28 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 29 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 29 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 30 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 30 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 31 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 31 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 32 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 32 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 33 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 33 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 34 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 34 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 35 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 35 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 36 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 36 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 37 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 37 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 38 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 38 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 39 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 39 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 40 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 40 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 41 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 41 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 42 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 42 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 43 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 43 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 44 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 44 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 45 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 45 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 46 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 46 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 47 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 47 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 48 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 48 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 49 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 49 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 50 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 50 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 51 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 51 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 52 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 52 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 53 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 53 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 54 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 54 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 55 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 55 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 56 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 56 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 57 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 57 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 58 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 58 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 59 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 59 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 60 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 60 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 61 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 61 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 62 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 62 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 63 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 63 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 64 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 64 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 65 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 65 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 66 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 66 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 67 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 67 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 68 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 68 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 69 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 69 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 70 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 70 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 71 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 71 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 72 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 72 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 73 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 73 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 74 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 74 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 75 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 75 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 76 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 76 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 77 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 77 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 78 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 78 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 79 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 79 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 80 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 80 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 81 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 81 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 82 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 82 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 83 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 83 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 84 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 84 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 85 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 85 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 86 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 86 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 87 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 87 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 88 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 88 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 89 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 89 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 90 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 90 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 91 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 91 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 92 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 92 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 93 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 93 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 94 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 94 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 95 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 95 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 96 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 96 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 97 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 97 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 98 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 98 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 99 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 99 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 100 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 100 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 101 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 101 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 102 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 102 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 103 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 103 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 104 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 104 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 105 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 105 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 106 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 106 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 107 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 107 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 108 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 108 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 109 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 109 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 110 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 110 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 111 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 111 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 112 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 112 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 113 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 113 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 114 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 114 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 115 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 115 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 116 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 116 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 117 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 117 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 118 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 118 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 119 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 119 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 120 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 120 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 121 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 121 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 122 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 122 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 123 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 123 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 124 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 124 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 125 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 125 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 126 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 126 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 127 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 127 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 128 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 128 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 129 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 129 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 130 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 130 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 131 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 131 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 132 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 132 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 133 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 133 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 134 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 134 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 135 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 135 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 136 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 136 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 137 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 137 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 138 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 138 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 139 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 139 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 140 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 140 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 141 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 141 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 142 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 142 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 143 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 143 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 144 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 144 1/2 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 145 Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12; 145 1/2 Nos. 4, 5, 6, 7, 8, 9, 10,

L. COES' GENUINE IMPROVED Knife Handle

PATENT

Screw Wrenches

MANUFACTURED BY
L. COES & CO.,
Worcester, Mass.

ESTABLISHED IN 1839.

Patented July 6, 1885. Patented July 8, 1884.

Registered March 31, 1876.

Sectional view illustrates our NEW KNIFE HANDLE, showing Malleable Iron Frame and Shank of Bar keyed into position.

Straight Bar, Extra LONG NUT FOR SCREW IN JAW.

The Best Made and Strongest Wrench in the Market.
Send for Illustrated Price List and Circular.

DURRIE & McCARTY,
NEW YORK,
Sole Agents.

ILLINOIS IRON & BOLT CO.,

Nos. 20 TO 26 MAIN STREET,
Carpentersville, Kane Co., Ill.

BAILEY • DRILL,

NO 5.

A POWERFUL MACHINE.

SIMPLE,
STRONG AND
DURABLE.

WILL DRILL UP TO 1½ INCHES.

Every Drill is Set in Perfect Line
and Tested Before Shipping.

WRITE FOR PARTICULARS AND PRICES.

E. MERRITT & CO.
ESTABLISHED 1859 — BROCKTON, MASS.
The Only Manufacturers of a Complete Line of
TACK AND NAIL MACHINERY.
SEND FOR CIRCULAR. — UPRIGHT DRILLS.

BRASS AND IRON SHIP CHANDLERY HARDWARE.
Yacht Fixtures, Nickel-Plated Canoe Trimmings, Cheapest and Best Side Lights in the Market, Awning Hardware. Specialties in Brass made to Order.
THE SHELTON BRASS HARDWARE CO., Birmingham, Conn.
Send for Illustrated Catalogue.
NEW YORK WAREHOUSES: 65 Chambers St. CHICAGO WAREHOUSES: 177 Lake St.

1885 PENNSYLVANIA LAWN MOWER.

Has No Equal,
Surpassing All Others.

AND PRONOUNCED
"THE BEST."

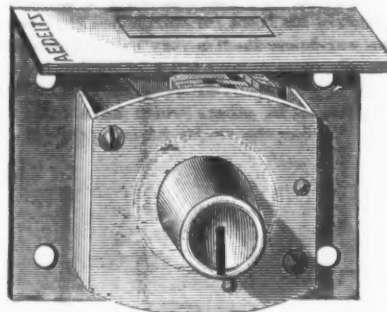
Illustrated Price Lists sent upon application.
Please write for same to

LLOYD & SUPPLEY HARDWARE CO., Phila.
DURRIE & McCARTY, New York.
AMES FLOW CO., Boston, Mass.
FRATT & CO., Buffalo, N. Y.
SIMMONS HARDWARE CO., St. Louis, Mo.
HAMILTON & MATHEWS, Rochester, N. Y.
MARKLEY, ALLING & CO., Chicago, Ill.
LOGAN, GREGG & CO., Pittsburgh, Pa.
JANNEY, SEIPLE & CO., Minneapolis, Minn.
HUNTINGTON, HOPKINS & CO., San Francisco, and Sacramento, Cal.
FOSTER, STEVENS & CO., Grand Rapids, Mich.
GEO. TRITCH HDW. CO., Denver, Col.
MATHEWS, CASE & CO., Los Angeles, Cal.

KRUSE & RAHLMAN, Cincinnati, Ohio.
JOHNSON BROS., Cincinnati, Ohio.
CLARK, QUINN & MORSE, Peoria, Ill.
BUHL, S. & CO., Detroit, Mich.
JAYMAN, CAREY & CO., Indianapolis, Ind.
LOCKWOOD TAYLOR & CO., Cleveland, Ohio.
WM. FLANKFURTH & CO., Milwaukee, Wis.
WALTER & LUDLOW, Cincinnati, Ohio.
THE TODD-ROBINSON IRON CO., Louisville, Ky.
MOOREHOUSE, WELLS & CO., Decatur, Ill.
A. E. BONESTELL, Troy, N. Y.
M. MITHOFF & CO., Columbus, Ohio.
BLISS, MIZE & SILLIMAN, Atchison, Kas.
SHULZ & ROSEA, St. Joseph, Mo.

ANDREW TREADWAY & SONS, Dubuque, Iowa.

A. E. DEITZ.

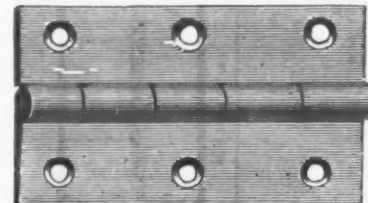


No. 51 Lock.

DURRIE & McCARTY, Agents,

97 Chambers and 81 Reade Sts.,

NEW YORK.

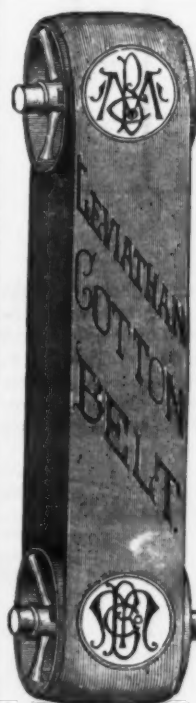


W. & J. TIEBOUT,

MANUFACTURERS OF

BRASS, GALVANIZED & SHIP CHANDLERY
HARDWARE.

Nos. 16 & 18 Chambers Street,
NEW YORK.



ALWAYS GIVES THE
UTMOST SATISFACTION.

Main Belting Co.,
Manufacturers of
THE LEVIATHAN
COTTON

BELTING.

Unsurpassed for
Strength, Durability and
Cheapness.

Made to any Length,
Width and Strength.

Main Driving Belts.
Guaranteed to Run
Straight, Even Through-
out.

No Cross Joints, Un-
affected by Damp.
Clings well to the Pulley.
Has no equal. In fact,
is THE BELT.

**MAIN BELTING
COMPANY,**
S. W. cor. Ninth and Reed
Sts., Philadelphia.
Also
248 East Randolph St.,
CHICAGO.



**BRYANT'S PATENT
EGG BEATERS.**

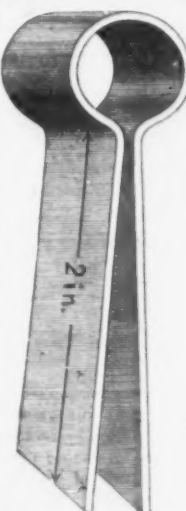
SIMPLE, PRACTICAL,
NOVEL.

Retails at 20 Cents Each.

Price, \$2.00 per doz. and dis.

ADDRESS MANUFACTURERS,

PAINE, DIEHL & CO.,
12 BANK STREET,
Philadelphia, Pa.



**BROWNING,
SISUM & CO.,**

85 Chambers St.,
Manufacture

Belt Hooks,

Cotters,

Spring Keys,

D Rings,

Staples,

and everything pertain-
ing to wire bending.

FACTORY,

BROOKLYN.

**HECTOR M. HITCHINGS,
LAWYER,**

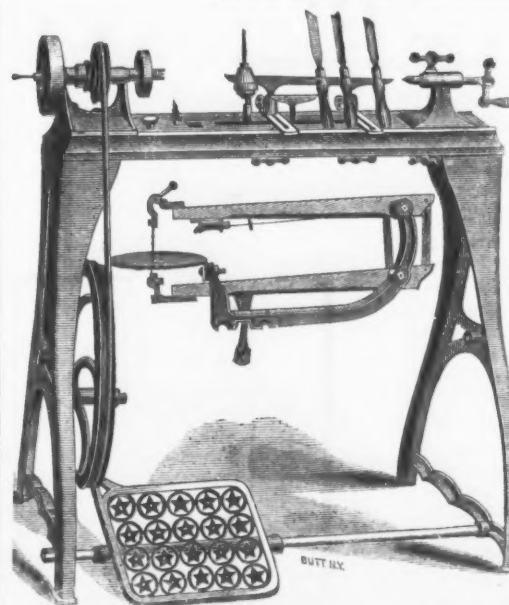
182 Nassau Street, New York City.

All legal business promptly and skillfully at-
tended to at reasonable rates.
Card with price list and references sent on ap-
plication.

WE HAVE ADDED THE

GOODELL LATHE AND SAW,

As seen in this Cut, to our Line of SCROLL SAW
SUPPLIES for the coming year.



It is by far the best Lathe in
market. We have also made
great improvements on the

Lester, Rogers and Cricket Saws.

Another generation of boys is
coming to the front, so that the
demand for these Saws is fast
increasing, and seems likely to
be as large as it was eight years
ago. Dealers can increase their
fall trade by laying in a stock.

Goodell Lathe and Tools ... \$10.00.
Scroll Saw Attach'm't, extra 2.00.
Lester Saw and Lathe ... 10.00.
Rogers Saw, No. 1 ... 3.50.
Cricket Saw, all Iron ... 2.50.
Bracket Sets, Nickel Plated,
per doz ... 15.00.
Bracket Sets, Pleasure and
Profit, per doz ... 10.00.

We are headquarters in New
York for Wood, Designs and
supplies of all kinds for bracket
sawyers. Our Star Bracket
Blades are superior to any others
in use, and are in demand in
many other countries.

There is a regular trade dis-
count to all dealers.

MILLERS FALLS CO.,

74 CHAMBERS STREET, NEW YORK.

CHAMPLAIN
Forged Horse Nails.
MANUFACTURED BY THE
NATIONAL HORSE NAIL CO.,
Vergennes, Vermont.
HOT FORGED AND COLD HAMMERED POINTED. MADE OF BEST
NORWAY IRON AND WARRANTED.
WAREHOUSE
97 CHAMBERS AND 81 READE STREETS NEW YORK.
DURRIE & McCARTY, Sole Agents.

H. B. SEIDEL, President. W. HASTINGS, Vice-Pres. and Gen'l Mgr. E. T. CANBY, Sec. and Treas.

THE SEIDEL & HASTINGS CO.

WILMINGTON, DELAWARE,

New York Office, No. 221 Pearl, Corner Platt Street,
MANUFACTURERS OF

BEST CHARCOAL BOILER PLATES, AND PLATE IRON GENERALLY.

ALSO BEST QUALITY HOMOGENEOUS STEEL PLATES.

We ask the special attention of the trade to our C. H. No. 1 Boiler Plates, which we
manufacture expressly for the Shells of Steam Boilers and stamp 50,000 pounds T. S. when
desired. One hundred and sixteen tests of this iron, made during the last three years by the
U. S. Inspectors of Steam Vessels, show an average tensile strength of 55,305
pounds to the sectional square inch, and an average reduction of area of the fractured
section of 30% per centum. Our prices are as low as the production of a good article will admit of.

VARIETY IRON WORKS.

ALFRED C. REX & CO.,
Manufacturers of
PATENTED HARDWARE SPECIALTIES AND NOVELTIES.
MAIN OFFICE AND FACTORY
FRANKFORD, PHILA.
126 Chambers St., New York, Chas. E. Spier, Mgr.
and 415 Commerce St., Phila.
New Spring Specialties—King Egg Beaters, awarded medal at American Institute, New
York; King Candle Lamp and Lantern, cheapest combination ever made.

ST. NICHOLAS SKATE.
SIMPLEST AND BEST.
We make the best Hink Skate
on the market.
Send for Catalogue and Price List.
St. Nicholas Toy Co.,
784 to 794 Madison St., Chicago.

PURE TURKISH EMERY.
WALPOLE EMERY MILLS,
South Walpole, Mass.

Latest Legal Decisions.

SALE—SUIT FOR PRICE.

R. built for P. a steam engine, and on a failure to pay after delivery suit was brought for the price. P. made no defense, and judgment went against him by default. It was found that the machine was defective, and P. brought an action on the warranty to recover damages, and R. set up in defense that the judgment in the action for the price settled all question about the sale. In this case—Parker vs. Roberts—the Supreme Court of New Hampshire decided that the plaintiff could recover his damages. Judge Carpenter, in the opinion, said: "The former judgment is not a bar. A default admits all the material allegations of the complaint except the amount of damages. There is no evidence that the damages on the warranty were taken into consideration by the parties in settling the amount of damages. It rests upon the party setting up a judgment as an estoppel to show that the matter in question was adjudicated by it."

MATERIAL ALTERATION IN CHECK.

C., a manufacturer, drew on April 20 a check and post-dated it April 22, to pay his workmen for that day. He did this because he was going away and might not return in time. He gave the check-book, with the check in it, to his clerk and directed him to take the check out on Saturday, April 22, draw the money and give it to the foreman to pay the men, should he, C., be detained. On April 21 the clerk took out the check, altered its date to April 21, and, on its presentation, the bank paid it. The clerk absconded with the proceeds. The check was charged against C.'s deposits, though he refused to acknowledge its validity, and he brought an action against the bank for the balance of his deposits, which was the amount of the check, and recovered a judgment. The bank carried the case—Crawford vs. West Side Bank—to the Court of Appeals of New York, where the judgment was affirmed. The Chief Judge (Ruger) in the opinion, said: "The relation existing between a bank and its depositor is in a strict sense that of debtor and creditor; but in discharging its obligation as a debtor the bank must do so subject to the rules obtaining between principal and agent. In discharging the customer's funds it can pay them only in the usual course of business, and in conformity to his directions. In debiting his account it is not entitled to charge any payments except those made at the time when, to the person whom, and for the amount authorized by him. It receives the depositor's funds upon the condition of disbursing them according to his order, and upon an accounting is liable for all such sums deposited as it has paid without receiving valid direction to make. The bank had no authority to pay the amount for which this check was drawn, for it had been altered in a material part, its date, and it was not, therefore, C.'s check. The bank undoubtedly had the same right as any other person to purchase a post-dated check and enforce it against the drawer in case of his liability thereon. This right to enforce payment, however, depended upon the question as to whether it was then the valid obligation of the maker. A material alteration of its terms would destroy its validity."

DELAY IN DELIVERY OF TELEGRAM.

McD. sent a message to Mrs. La Fountain, Kankakee, which was not delivered properly, as the sender claimed, and he sued for the statutory penalty. On the trial it was shown that the sender, when asked for the given name of Mrs. La Fountain, replied that it was not necessary, for she was well known. The company set this up as contributory negligence, and averred that they had made due delivery. The plaintiff recovered judgment and the company carried the case—Western Union Telegraph Co. vs. McDaniel—to the Supreme Court of Indiana, where it was reversed. Judge Elliott in the opinion said: "1. When it is shown that a telegram has not been properly delivered, it falls upon the company to explain the cause of the failure to deliver. 2. It is contributory negligence on the part of the sender of a telegraphic message not to give the first name of the party addressed and the residence, where it is demanded, unless the person is well and definitely known. In this case the person was not well known, and the town to which it was directed had 12,000 inhabitants. Clearly the plaintiff was at fault, and he cannot recover."

NEGOTIABLE INSTRUMENTS.

D. sued W. upon a bill of exchange, and the defense was set up that the plaintiff had notice that there was a partial failure of consideration, and the amount thereof was demanded in reduction of the plaintiff's claim. On the trial of this case—Davis vs. Wait—the jury were instructed: "The plaintiff having notice of the claim of damages and defects before he purchased the draft, if he did purchase it, would not affect his right to recover, provided he purchased it before it became due. There being no allegation of fraud in obtaining the bill, the question of notice is not material, provided the draft was purchased for value, in the usual course of business, before it became due." Upon this charge the jury gave the plaintiff a verdict, and the defendant carried the judgment to the Supreme Court of Oregon, where it was reversed. The Chief Justice (Walds), in the opinion, said: "The answer was a good defense. Partial failure of consideration of a bill of exchange may be set up to an action on the bill, and the defendant may recoup his damages, though they be unliquidated. If the indorsee takes a bill with notice of the failure of consideration his right to recover cannot be superior to that of his indorser."

AGENCY.

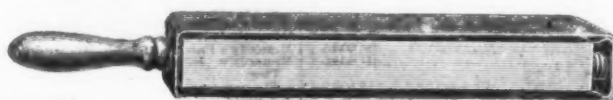
W. opened an account with a bank as agent, and he deposited to the credit of that account certain money which he had received for goods consigned to him by B. W. gave B. a check for the balance due him, W. on account of this sale, but the bank refused to pay it for want of funds, it having appropriated a large amount of the deposit to the payment of an old indebtedness of W. to it.

B. sued the bank to recover the amount of the check on the ground that the deposit, being composed of the proceeds of his goods sent to W., as his agent was his property, and he recovered a judgment. The bank carried the case—Baker vs. New York National Exchange Bank—to the Court of Appeals of New York, where the judgment was affirmed. Judge Andrews, in the opinion, said: "The relation between a commission agent and his principal for the sale of goods is a fiduciary relation. The title to the goods until sold remains in the principal, and when sold the proceeds, whether in the form of money or notes or other securities, belong to him, subject to the lien of the agent for advances and other charges. The agent holds both the goods and proceeds upon an implied trust to account to and pay over to him according to his direction. The relation between the parties with respect to the proceeds of the goods is not that of debtor and creditor simply. The money and securities are specifically the property of the principal, and he may follow and reclaim them so long as the identity is not lost, subject to the rights of a purchaser in good faith for value. The parties may so deal, however, that the consignee becomes a mere debtor to the consignor for the proceeds of sales, having the right to appropriate the specific proceeds to his own use. In the present case there is nothing to change the rule. The proceeds of the sales here were deposited in the name of W., as agent, and he had no property in them, absolutely. They would be readily identified as the proceeds of the sale of B.'s goods, and he can take them as against the bank or any other creditor of W."

HARDWARE NOVELTIES.

Combination Razor Strop.

Tower & Lamont, Rochester, N. Y., are manufacturing their new Combination Razor Strop, No. 04, which is illustrated herewith. Our readers will understand that a combination strop is one having a hone body with two hones, or one hone and a buff-leather side,



Tower & Lamont's New Combination Razor Strop.

combined with an extended belt around the two other sides of the body, with means for tightening and relaxing the belt. This has usually been accomplished by means of a threaded rod passing through a nut, the nut being placed between the belt and the hone body. The special feature of the strop here represented is that the belt is constantly held in tension without the use of screw, nut or handle, by means of a stout steel spring placed in the outer end of block or hone body, and extending sufficiently to hold the belt at proper tension. The point is also made that there is no liability to failure on account of the stretching of the belt, because the belts are prepared especially for this strop, so that they cannot stretch. Another important feature to which attention is directed is the greater length of this strop—13½ inches—as compared with others, and the fact that the tension of the belt is not liable to be disturbed in use, as is the case when it is regulated by screw and nut. The peculiar elasticity of the belt given by the spring is also alluded to as having the effect of hugging the razor blade closely, and thus making the operation of the strop more rapid and effective.

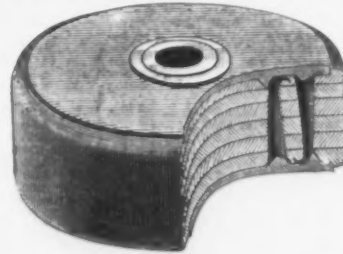
Clark's Patent Compressed Paper Skate Rollers.

The illustrations given herewith represent the appearance and construction of these Rollers, which are manufactured by George



Clark's Compressed Paper Skate Roller.

P. Clark, Windsor Locks, Conn. The roller is described as formed by placing a number of layers of paper between two circular blades of metal furnished with penetrating points, and having a central tube. The points are made upon the inner surface of, and integral with, the plates, and of such relative length to the thickness of the body of paper that, when forced through the



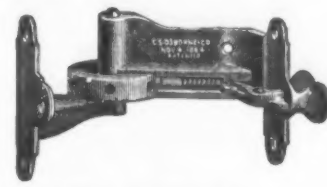
Clark's Compressed Paper Skate Roller, Sectional View.

body, they will be turned and clinched, as shown in one of the cuts. To cause the points to clinch properly the plates are formed with triangular ribs upon their inner faces at the base of the points, so that the points of the opposite plate, after being pressed through the body, will come against one of the inclined surfaces of the ribs and then be deflected and made to clinch, as shown. In putting the roller together the sheets forming the body are placed between the sides, when the roller is subjected to heavy pressure and the points pass through the body from each side and clinch, thereby

holding the paper of the body in a solidly compressed condition. The roller is then placed in the lathe and the edge turned down to the desired size. The central tube is then inserted. Among the advantages claimed for these rollers are their superior durability, owing to the heavy pressure to which the paper is subjected; that they have a hard and polished surface which will not chip nor break; that, owing to the fact that they do not wear down at edges and become uneven, they are especially smooth and easy running, and that they are not liable to slip on nor injure the floor, as wooden rollers are apt to do. Their comparative noiselessness is also alluded to.

New Locking Hinge.

The annexed engraving represents a new Locking Hinge which has been recently brought out by C. S. Osborne & Co., of Newark, N. J. This hinge is adapted for use on window blinds and is claimed to



Robinson's Locking Hinge.

have several valuable features. The hinge is operated by the thumb-pieces at the end of the part fastening to the blind. By pressing on these parts a spring bolt is moved either backward or forward, as the case may be, which enters holes prepared for it in the disk of metal shown on the hinge, and thus locks the blind in any desired position. The whole device is simple, and, it is claimed, is not likely to get out of order. Among the advantages to which attention is directed by the manufacturers are that, with the use of this hinge, staples and other kinds of separate fastenings are

Pivot for Hanging Doors.

One of the displays at the Novelty Exhibition, at Philadelphia, bore the startling title of "Doors Hung Without Hinges." Fig. 1 of the engravings represents the appearance of a pair of doors arranged in

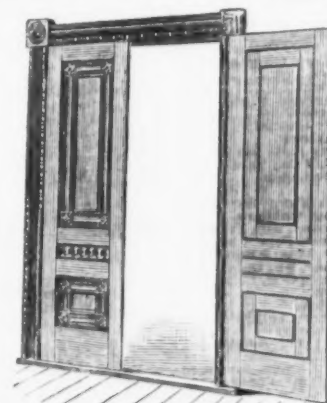


Fig. 1.—Doors Hung with Moyer's Pivot.

the general manner indicated. Close inspection of the model showed that, in place of hinges, pivots arranged on the general plan indicated in Fig. 3 were employed, being

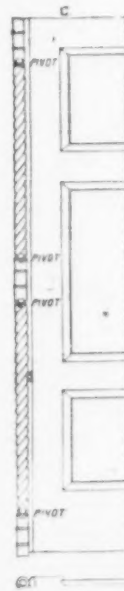


Fig. 2.—Position of Pivots in Architrave.



Fig. 3.—Section Through Pivot.

located in the architrave, finishing the door as shown in Fig. 2. The object of this construction, which is put upon the market by J. W. Moyer, 402 North Eleventh street, Philadelphia, is to avoid the mutilation of doors and the finish about doorways and the unsightliness of hinges. This construction also avoids an aperture between the edge of the door and the jamb when open. Another advantage to which the inventor directs attention is that this construction avoids the

friction of from two to ten or more points to each door, as is the case with the ordinary hinges in common use. He further directs attention to the fact that doors which are liable to sag when hung with hinges in the usual manner are, by the use of the pivot, fastened to the architrave, which rests on the floor in such a way as to avoid sagging. For self-closing doors there is used in connection with the pivot a concealed spring, doing away with the ill-looking contrivances sometimes used for the same purpose, and which mar the beauty of well-finished doors. The engravings very clearly show the features of this improvement.

New Flat Key Mortise Lock.

The Eagle Lock Co., Terryville, Conn., and 93 Chambers street, New York, have recently placed on the market a new

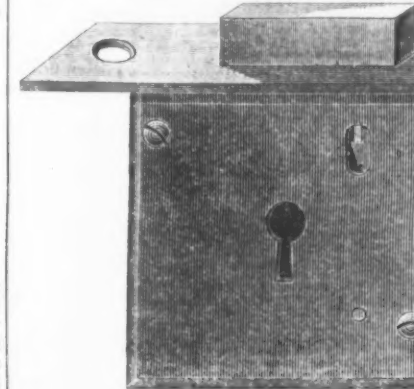


Fig. 1.—New Flat Key Mortise Lock.

lock, which we illustrate in the annexed engravings. The principal feature of this Drawer or Cupboard Lock is that the key-guide is made adjustable to drawers from 1 to 1½ inches thick. The key-guide, instead of being of one piece with the lock, is fastened to the escutcheon plate, as shown in the cut, Fig. 2. This key-guide consists of a rod provided with a longitudinal groove through which the key is passed. The guide passes through the lock and projects beyond, according to the thickness of the drawer. The key is adjusted to the lock by the bit, meeting the casing at the back of the lock, while the shank passes through in the guide. Another feature of this lock to which the manufacturers call attention is the manner of fastening the lock casing to the face-plate, so that the former always hangs vertically. As the key-guide when passed through the lock is at right angles to the casing, it is obvious that if the lock casing and face-plate were secured rigidly together the former would have to be adjusted very finely to its mortise. But, the casing being suspended from the face-plate by two rivets or lugs, it can swing slightly either way, and

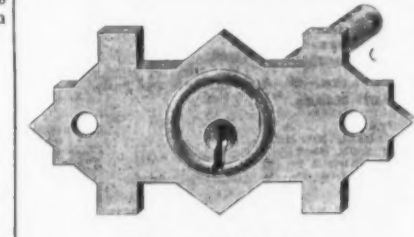


Fig. 2.—Key Guide.

so adjust itself to any imperfections in the mortise. The manufacturers allude to these features of construction as facilitating the work of setting the lock.

Testing Magnetism in Watches.

Some very pretty experiments showing the effects of magnetism on the steel parts of a watch can be very easily made as follows: Take a glass of water, a balance-wheel and an ordinary magnet—say, 12-inch horseshoe. The balance-wheel will float if carefully laid on the surface of the water. Bring the magnet near it and it will be attracted, repelled or revolved, as the different poles are brought to bear, and when the magnet is removed to a distance the balance will range itself in the north and south polarity, the same as a compass needle. A hair spring will float in the same way and is much more sensitive to the magnetic influence—the delicate lines of steel are alive to the slightest change of polarity, as exhibited by the magnet, and if left free it will immediately range itself in the north and south line. Also the fork, the regulator or any of the flat pieces of steel can be made to float, care being taken that they are dry and carefully laid upon the water, and their antics under the magnetic influence are very amusing, appearing "like things of life" as they "bout face" turn sharp corners or "scot" across the surface of the water in obedience to the attracting force. It will be noticed that the finer finished pieces of steel and those with the finest points are much the more sensitive, thus demonstrating the assertion that the finer the watch the more susceptible it is to magnetism. These simple experiments, which any watchmaker can readily try, show why and how a watch, when once magnetized, is affected by varying influences of magnetic or electric conditions. The parts are each attracting the other, but with a varying force as the position of the watch is changed or brought into an atmosphere more or less charged with magnetic or electric forces. Some such simple investigations as these may furnish a key to mysteries which have long puzzled many skillful watchmakers, and will account for the unsatisfactory performance of watches otherwise perfect.

The Scranton Steel Co. have eclipsed their earlier records for rapid work in the converter during the last few days. Until then 72 heats from two converters in a 12 hour shift was the highest record. On November 27 there were made in the two small converters, running single turn, 75 heats, producing 307 tons of ingots. On the 30th ult. the

Foreign Markets.

FRANCE.

PARIS, November 30, 1885.—Metals.—The advance in Copper in England, while bringing about a similar movement here, has had the effect of stiffening the price of other Metals and causing consumers not to hesitate any further in securing a supply to meet at least their more immediate requirements. We quote at the close, in francs per 100 kg.: Copper—Chill Bars, 105.50 @ 107; Brass and Slabs, 112.50; Best Selected, 115, and Pure Corrocor Ore, 105. Tin—Banca, 350.25; Billiton, 347.50; Straits and Australian, 345, and English do., 341.50; Lead, 28.25 @ 29.25, and Spelter, 37.50 @ 38. Iron.—The market in this city has continued in the same unsatisfactory condition as before, at 13 @ 13.50 francs. Merchant, and Old Rails have been weak at 7 @ 7.50. For the present, so near winter, the situation hinges upon what the Chambers are going to do about public works. Should they show a good disposition, and come to the assistance of our stagnant industry freely and liberally, without any further unnecessary delay, the French iron market will improve in tone at once, probably, and consumers will show greater readiness to anticipate wants for the spring at ruling low prices, while makers will raise their pretensions correspondingly. Meanwhile there has been no improvement at the North, where Merchant Iron does not bring over 12 @ 12.50 francs. The Haute-Marne has been quiet and weak at 14 francs for Merchant and 15.25 Mixed. Coal.—With the advent of colder weather Coal is looking up, and may be quoted 48 @ 52.—Monteur des Interêts Matériaux.

BELGIUM.

BRUSSELS, November 30, 1885.—Iron.—If our Iron trade were to be left to its own resources, the immediate future would appear dismal in the extreme; fortunately the Government steps in in good time and resolves to adopt on its part a metallic Sleepers generally. This is all the more important, since at present the export trade, too, has been falling off. It is now expected that we shall be able to bridge over the winter better than was apparent but a short time ago. The movement, which is becoming general in Germany, to restrict production and regulate prices, so far as feasible, also tends to place our industry on a sounder footing, as it is likely that something similar will soon be accomplished among ourselves. Add to this the better prospects in America, and it is safe to say that the worst days of paralysis and uninterrupted decline seem to be a thing of the past. The Iron and Steel movements in Belgium during the first nine months were:

	Imports.	Exports.		Imports.	Exports.
	1884.	1884.		1884.	1884.
	Tons.	Tons.		Tons.	Tons.
Cast Steel	11	97	854	470	
Steel Rails	286	534	33,128	48,816	
Roller Steel	2,410	2,977	5,653	9,145	
Wrought Steel	322	433	1,341	1,359	
Pig Iron	78,960	102,474	8,929	5,194	
Old Iron	15,367	8,704	3,465	9,071	
Iron Wire	3,423	4,637	1,494	1,375	
Iron Rails	531	417	6,943	14,598	
Sheet Iron	645	526	24,199	30,905	
Other Iron	3,992	4,391	164,333	164,236	
Nails	208	266	5,369	4,699	
Finished Iron	2,132	2,069	17,179	16,159	
Castings	375	715	14,687	8,634	
Total	106,390	128,214	287,033	314,561	

Coal.—Has been less active and is drooping.—Monteur Industriel.

GERMANY.

HAMBURG, November 30, 1885.—Iron.—Our Dortmund correspondent writes that at length a better feeling prevails in consequence of the successful formation of syndicates in the Wire Rod and Spigot branches of producing, soon to be followed by a syndicate that is to regulate the Cast-Iron Pipe output, which was five times the amount that could be placed currently. The first great success, it will be remembered, was the Spelter syndicate, and the plan there laid down is now gradually being adopted throughout the Iron trade, so that soon there is not a single branch of any importance that will not be under proper joint management as regards the joint output and price. As at the same time it is hoped and believed that the Iron trade will go on improving in the United States, there is now an undercurrent of great confidence in the future which of itself suffices to place matters on a better footing. But it was about time that something of the kind should be done, for Spiegel was selling as low as \$3.50 marks per ton, Merchant at 10 @ 10.1, and Coarse Sheets below 13. The improvement in Wire Rods is fully sustained, the more so as several mills are now booked for months to come. Nothing in the way of a revival is as yet noticeable in Steel Rails and Railroad Material generally, but the outlook is, if anything, encouraging. Metals have been in a listless sort of condition except Copper, which is looking up, in sympathy with the London advance.—Borrenhaug.

SIEGEN, November 30, 1885.—Iron.—On the 14th inst. all blast-furnace owners united in producing Spiegel formed a syndicate to regulate production and prices, both for the domestic market and the selling to exporters. The combination, dating from above date, is to remain in force till January 1, 1886. There is to be a board of directors of five and a chairman and manager, through whose hands everything is to pass. The Spiegel coming under this convention is that ranging between 6 and 10 % Manganese, and those sorts below 6 % Manganese, but not exceeding 0.1 % Phosphorus. The joint production of 1884-85, which was 137,000 tons, is not to be exceeded.—Cologne Gazette.

HOLLAND.

ROTTERDAM, November 17, 1885.—Tin.—There has been increased firmness during the week at 54.75, Billiton, December delivery. At Amsterdam futures of the latter have been a good request at 54.62½ @ 54.75 guilders per 50 kg., and distant do. at 55. Banca, without anything doing, at 56 @ 56.25, spot, and 55.37½ @ 55.50, November sale.—Koch & Vierboom.

AUSTRIA.

VIENNA, November 17, 1885.—Iron.—Business is dull and prices are depressed. This will continue so till at length makers shall be able to agree to curtail their output, somewhat like what is now being done in most Iron branches in Germany. Meanwhile we have only to repeat our previous nominal quotations, viz.: Fig. 1 @ 58; Merchant, 100 @ 125, and Sheets, 135 @ 167; Bessemer, 100 @ 110 florins per ton.—Austrian Trade Journal.

CHILE.

VALPARAISO, October 2, 1885.—Copper.—The rise in exchange and further unfavorable cable news have depressed the price to \$16.35, which latter figure, with 30/ freight and 245d. exchange, equals \$29.18 in England. Sales, 885 quintals, from \$17.30 down to \$16.35. Nitrate.—Unfavorable advices from Europe and disagreement among makers have caused great dullness. A meeting of the latter is to come off on the 10th inst., when, it is hoped, all difficulties will be removed. Meanwhile the price has been visited by a storm wave, destroying Nitrate on the coast and damaging several factories. This inundation was followed a week later by a great fire, destroying \$1,500,000 of property, but no Nitrate works. The nominal price for the present is \$3.80 for 95 %, which, with 29/9 freight and 245d. exchange, equals 10.34 in England. Charta since the 10th of September have not exceeded 2200 tons for Europe. September shipments were 31,500 tons to Europe; none to the United States. Loading, 35,000 tons for Europe and only 800 tons for the United States. Coal.—While the stock is ample, the fuel is neglected. We quote West Hartley, 36, and Orell, 23. Exchange, 90 days, London, 2½ d.—Weber & Co.

Current Hardware Prices, December 2, 1885.

Hay Knives.

Steebing's Genuine.....	dis 70475@210
Steebing's Tinned Ends.....	dis 40410
Chase's Hard Metal.....	dis 50410
Bush's.....	dis 20
Lincoln's Pattern.....	dis 70410
Weed's.....	dis 30410
Boss Nos. 1 2 3	
\$7.00 8.00 9.00 10.00. # dos, dis 00410@10	
Money Drawers. —# dos., #18.	
Wire Carpet Nails.....	See Tacks
Nails. —See Trade Report	
Wire Nails, list Nov. 11, 1885.....	dis 50410
Nail Puller.	
Curtis Hammer.....	# dos \$0.00 net
Giant, No. 1.....	# dos \$30.00, dis 10
Pelican.....	# dos \$0.00, dis 25
Nuts and Washers.	
Square Nuts.....	9/16 off list
Hexagon.....	10/16 off list
Washers.....	9/16 @ 10¢ off list
lots less than 100 #, # # add 1/4¢ to list 1 #	
boxes, 14¢ to list.	
Nut Crackers.	
Table (Hudson & Beckley Mfg. Co.).....	dis 40
Blake's Pattern.....	# dos dis 10
Turner & Seymour Mfg. Co.....	dis 50
Oakum.	
Government.....	# 714@714
U. S. Navy.....	# 634@7
Navy.....	# 546@6
Oilers.	
Zinc and Tin.....	dis 65455@5
Brass and Copper.....	dis 50410
saleable (Hammer's), No 1, \$3.50; No 2, \$4.00;	
No. 3, \$4.40 # dos., dis 10 @ 10¢10	
Prior's Patent or "Paragon" Zinc.....	dis 6042 @ 0410
Prior's Patent or "Paragon" Brass.....	dis 50
Onstead's Tin and Zinc.....	dis 60
Onstead's Brass and Copper.....	dis 50
Broughton's Zinc.....	dis 60
Broughton's Brass.....	dis 60

Nickel-Plating and Polishing Materials.

SOLE MANUFACTURERS OF

Established 1863. Incorporated 1881. THE

Largest Manufacturers IN THE WORLD OF

THE AMERICAN DYNAMO ELECTRO-PLATING MACHINE.

Best Plating Machine in the Market.

HEADQUARTERS FOR EVERYTHING IN THE PLATING AND POLISHING LINE.



WORKS: OFFICES:

Zucker & Leitch Chemical Co., 538 to 564 W. 16th St., 36 to 40 11th Ave., NEW YORK, U. S. A.

WHOLESALE METAL PRICES, December 2, 1885.

METALS.

IRON.—Duty: Bars, 8-10¢ to 11-10¢; provided that no bar iron shall pay a less rate of duty than 85¢. Sheet, 11-0¢ to 15-10¢. Band, Hoop and Scroll, 14 to 14-10¢. Railroad Bars weighing more than 25 lb per yard, 7-10¢ of 1¢ per lb.

Standard American Pig Iron.

Foundry No. 1 X... ton \$17.50 @ 18.50
Foundry No. 2 X... ton 16.00 @ 16.50
Gray Forge... ton 15.25 @ 15.50

No. 1 Scotch Pig Iron.

Carnbroe... ton 18.50 @ 19.00
Coltess... ton 19.50 @ 20.00
Shotts... ton 19.50 @ 20.00
Glenarnock... ton 18.50 @ 19.00
Gartbarrie... ton 19.50 @ 20.00
Langloan... ton 19.00 @ 19.50
Summerlee... ton 18.50 @ 19.00
Dalmeilington... ton 17.50 @ 18.00
Eglinton... ton 18.50 @ 19.00
Clyde... ton 18.50 @ 19.00

Rails.

Steel, at Eastern mills... ton \$33.50 @ 34.00
Old Rails, T... ton \$18.50 @ 19.00

Scrap.

Wrought, 1/2 ton from yard... 18.50

Bar Iron from Store.

Common Iron:
1/2 to 1 in. round and square... 1/2 lb 1.6 @ 1.75¢
1 to 1 1/2 in. 3/4 to 1 in... 1/2 lb 1.85 @ 2.3¢

Refined Iron:
1/2 to 1 in. round and square... 1/2 lb 1.9 @ 2.4¢
1 to 1 1/2 in. 3/4 to 1 in... 1/2 lb 1.7 @ 2.3¢
Rods—1/2 and 1 1/2 in. round and sq... 1/2 lb 2 @ 2.5¢
Bands—1 to 5 1/2 in. to No. 12... 1/2 lb 2 @ 2.5¢
Burden's Best "H. B. & S." Iron, base price... 1/2 lb 2.5¢
Norway Nail Rods... 1/2 lb 5 @ 6¢

Sheet Iron from Store.

Common R. G.
American Cleaned.
Nos. 10 to 16... 1/2 lb 2.70 @ 3¢
17 to 20... 1/2 lb 3 @ 3¢
21 to 24... 1/2 lb 3.125 @ 3¢
25 and 30... 1/2 lb 3.25 @ 3¢
27... 1/2 lb 3.375 @ 3.50¢

Galvanized, 10 to 30... 1/2 lb 5 @ 5¢
Galvanized, 21 to 24... 1/2 lb 5 1/2 @ 5¢
Galvanized, 25 to 26... 1/2 lb 6 @ 5¢
Galvanized, 27... 1/2 lb 6 1/2 @ 5¢
Galvanized, 28... 1/2 lb 7 @ 5¢
American Russia... 1/2 lb 10 @ 10 1/2¢
Russian... 1/2 lb 10 @ 10 1/2¢
American Cold Rolled B. B... 1/2 lb 5 @ 7¢

Iron Wire.—(See Wire.)

STEEL.—Duty: Ingots, Bars, Sheets, &c., valued at 4¢ per lb or less, 45¢ ad. val.; valued above 4¢ and not above 7¢ per lb, 2¢ ad. val.; valued above 7¢ and not above 10¢ per lb, 3¢ ad. val.; valued above 10¢ per lb, 3 1/2¢ ad. val. Extra—Steel Bars, Rods, &c., cold hammered or polished, in any way in addition to ordinary hot rolling, 1 1/2¢ in addition to above; Steel Circular Saw Plates, 1¢ in addition to the above.

American Cold Steel.

For American Steel, see Pittsburgh quotations.

Chrome Steel.

Too, Steel, ordinary sizes, 1/2 to 3 inches, net... 10 @ 14¢
Adamantine Shoes and Dies... 8 @ 8¢
Magnet Steel... 14 @ 14¢

English Steel.

Best Cast... 1/2 lb 15 @ 17¢
Extra Cast... 1/2 lb 16 @ 17¢
Circular Saw Plates... 1/2 lb 14 @ 14¢
Round Machinery, Cast... 1/2 lb 10 @ 10¢
Swaged, Cast... 1/2 lb 10 @ 10¢
Best Double Shear... 1/2 lb 15 @ 15¢
Blister, 1st quality... 1/2 lb 10 @ 10¢
German Steel, Best... 1/2 lb 10 @ 10¢
3d quality... 1/2 lb 8 @ 8¢
2d quality... 1/2 lb 9 @ 9¢
Sheet Cast Steel, 1st quality... 1/2 lb 15 @ 15¢
2d quality... 1/2 lb 14 @ 14¢
3d quality... 1/2 lb 13 @ 13¢

TIN.—Duty: Plates, Sheets, Tagger and Terne, 1¢ per lb; Bars, Block and Pig free.
Banc... 1/2 lb 22 @ 22¢
Strait... 1/2 lb 21 1/2 @ 21 1/2¢
English... 1/2 lb 21 1/2 @ 21 1/2¢
oar... 1/2 lb 25 1/2 @ 25 1/2¢

Charcoal Tin Plates.

C 10x14 225 sheets... box \$5.35 @ 7.25¢
I 12x12 225 sheets... 10.50 @ 14.50¢
I 10x20 112... 6.25 @ 9.25¢
I 10x14 225 sheets... 6.25 @ 9.25¢
I 12x12 225 sheets... 6.25 @ 9.25¢
I 10x20 112... 6.25 @ 9.25¢
I 10x14 225 sheets... 6.25 @ 9.25¢
I 12x12 225 sheets... 6.25 @ 9.25¢
I 10x20 112... 6.25 @ 9.25¢
I 10x14 225 sheets... 6.25 @ 9.25¢
For each additional X add... 1.25 @ 2.00

Coke Tin Plates.

Best. Ordinary.
I 10x14... \$4.75 @ \$4.65 @ 4.75¢
I 12x12... 4.87 1/2 @ 4.75¢
I 10x20, gutters, 225 sheets, 8.00 @ 7.25¢
I 10x20, 112 sheets... 10.25

Terne Plates.

Prime Char. 3d. quality Coke.
I 10x14 225 sheets... \$6.87 1/2 @ 14.35¢
I 10x20 112... 6.25 @ 9.25¢
I 10x14 225 sheets... 6.25 @ 9.25¢
I 12x12 225 sheets... 6.25 @ 9.25¢
I 10x20 112... 6.25 @ 9.25¢
I 10x14 225 sheets... 6.25 @ 9.25¢
I 12x12 225 sheets... 6.25 @ 9.25¢
I 10x20 112... 6.25 @ 9.25¢
I 10x14 225 sheets... 6.25 @ 9.25¢
I 12x12 225 sheets... 6.25 @ 9.25¢
I 10x20 112... 6.25 @ 9.25¢

Tin Boiler Plates.

XX 14x26, 2 sheets for No. 7, 112 sheets... @ \$12.00
XX 14x26, 2 " " No. 8... @ 13.00
XX 14x26, 2 " " No. 9... @ 15.00

COPPER.—Duty: Pig, Bar and Ingot, 4¢; Old Copper, 8¢ per lb. Manufactured (including all articles of which Copper is a component of chief value), 35¢ ad valorem.

Ingot, Lake... 10 1/2 @ 11 1/2¢
Ingot, Baltimore... 10 1/2 @ 11 1/2¢
Ingot, Anchor... 10 1/2 @ 11 1/2¢
Braziers' Copper, ordinary sizes, 10 oz. 1/2 sq. ft. and over... @ 16¢
Braziers' Copper, ordinary sizes, under 10 oz. and over 12 oz. 1/2 sq. ft... @ 18¢
Braziers' Copper, 10 oz. and 12 oz. 1/2 sq. ft... @ 20¢
Lighter than 10 oz. 1/2 sq. ft... @ 20¢
Circles less than 84 in. in diam... @ 20¢
84 in. diam. and over... @ 22¢
Segment and Pattern Sheets... @ 20¢
Locomotive Fire-Box Sheets... @ 19¢
Sheathing Copper, over 12 oz. 1/2 sq. ft... @ 14 1/2 @ 15¢
Bolt Copper... @ 18¢
Copper Bottoms... @ 10 1/2 @ 17 1/2¢
Nickel Plated Sheathing... @ 35¢
Plating extra... for boilers @ 37¢
Flat Copper Boiler Bottoms or Fit Bottoms, cut to special sizes... @ 21¢

Tinuing.

14x48, by the case... sheet, 8¢
14x48, less than case... 8¢
For tinning both sides, double the above amount.

O'Neill's Patent Finished Copper.—Net 14x48... 23¢

14 and 16 oz. and heavier... By the case, 1/2 lb 23¢
12 oz. and lighter... 34¢

Boiler Sizes: 7 in., 14x52, 8 in., 14x56, 9 in., 14x60, 11 and 16 oz. and heavier... By the case, 1/2 lb 21¢
(All sizes not over 20 in. wide.)
24x48 and 30x60... 34¢

14 and 16 oz. and heavier... 1/2 lb 34¢
2 oz... 57¢

Copper Wire.—(See Wire.)

Sheathing Metal, Yellow Sheathing Metal, 1/2 lb... 20¢ @ 21¢

BRASS AND GERMAN SILVER.

Brown & Sharpe's Gauge the Standard for Metal; Old English Gauge the Standard for Wire.

Brass Manufacturers' Price List, January 17, 1884... dis. 30 @ 30¢

LEAD.—Duty: Pig, 3¢ 1/2 per 100 lb; Old Lead, 3¢ per 100 lb; Pipe and Sheet, 5¢ per 100 lb.

American... 1/2 lb 5 @ 5¢
Pipe... 1/2 lb 5 @ 5¢

Block Tin Pipe... 40¢
Tin Lined Pipe... 10¢, dis 20¢
Sheet... 7¢, dis 20¢
Shot, 1/2 bag... Drop, \$1.40; Buck, \$1.65
Chilled Shot, 1/2 bag... \$1.65

ANTIMONY.
Hallett's... 1/2 lb 9 @ 9¢
Cookson... 1/2 lb 9 @ 10 1/2¢
SPELTER.—Duty: Pigs, Bars and Plates, \$1.50 per 100 lbs.

American, cash... 4 1/2¢ @ 5¢
Hazenport... 1/2 lb 16.00 @ 16.50
ZINC.—Duty: Pig or Block, \$1.50 per 100 lbs.

Sheet, 2 1/2¢ per lb.
600 lb casks... 5.40 @ 5.60¢
Zinc—Open... 6.50 @ 7¢
Zinc Tubing... dis. 10 @ 20¢

Zinc Tubing.—Dis. 25¢.
Plain... 37¢
Fancy... 38¢
Scotch and Extra Patterns... 36¢

HABBIT METAL.
N. P. U... 1/2 lb 6 1/2 @ 7¢
X... 1/2 lb 6 @ 6 1/2¢
J. H... 1/2 lb 30¢

WIRE.
Market Wire.—Put up in 63 lb bundles.
Nos. 00 to 9, 10, 11, 12, 13, 14, 15, 16, 17, 18.

10 11 11 1/2 12 1/2 14 15 16
Bright Market Wire... dis 70¢
Charcoal... dis 50¢
Bale Wire, Nos. 10 to 12... dis 65¢

Annealed Market Wire... dis 70¢
Fence Wire, Nos. 8 and 9... dis 70¢
Grass Wire, Nos. 10 to 14... dis 65¢

Coppered Market Wire... dis 65¢
Bale Wire, Nos. 7 to 12... dis 60¢
Galvanized Market Wire... dis 60¢

Fence Wire... dis 60¢
Stone or Weaving Wire.
Nos. 16 17 18 19 20 21 22 23 24 25 26

Cents... 14 15 16 19 20 21 22 23 24 25 26
Nos. 27 28 29 30 31 32 33 34 35 36
Nos. 37 38 39 40 41 42 43 44 45 46

Cents... dis. 70 @ 70¢
Nos. 10 to 15... dis. 70 @ 70¢
27 to 36... 75 @ 75¢
Galvanized Stone Wire... 50¢

Steel Wire.
Cast Steel, Steel Wire list... dis. 50¢
Brass and Copper Wire.
Old English Gauge the Standard.—Dis 30 @ 30¢.

Common High Low
Brass Brass Copper.

All Nos. to No. 16... \$0.22 @ \$0.30
No. 17 and 18... 32 @ 32¢
" 19 and 20... 32 @ 32¢

" 21... 32 @ 32¢
" 22... 32 @ 32¢
" 23... 32 @ 32¢
" 24... 32 @ 32¢
" 25... 32 @ 32¢

" 26... 32 @ 32¢
" 27... 32 @ 32¢
" 28... 32 @ 32¢
" 29... 32 @ 32¢
" 30... 32 @ 32¢

" 31... 32 @ 32¢
" 32... 32 @ 32¢
" 33... 32 @ 32¢
" 34... 32 @ 32¢
" 35... 32 @ 32¢

" 36... 32 @ 32¢
" 37... 32 @ 32¢
" 38... 32 @ 32¢
" 39... 32 @ 32¢
" 40... 32 @ 32¢

" 41... 32 @ 32¢
" 42... 32 @ 32¢
" 43... 32 @ 32¢
" 44... 32 @ 32¢
" 45... 32 @ 32¢

" 46... 32 @ 32¢
" 47... 32 @ 32¢
" 48... 32 @ 32¢
" 49... 32 @ 32¢
" 50... 32 @ 32¢

" 51... 32 @ 32¢
" 52... 32 @ 32¢
" 53... 32 @ 32¢
" 54... 32 @ 32¢
" 55... 32 @ 32¢

" 56... 32 @ 32¢
" 57... 32 @ 32¢
" 58... 32 @ 32¢
" 59... 32 @ 32¢
" 60... 32 @ 32¢

" 61... 32 @ 32¢
" 62... 32 @ 32¢
" 63... 32 @ 32¢
" 64... 32 @ 32¢
" 65... 32 @ 32¢

" 66... 32 @ 32¢
" 67... 32 @ 32¢
" 68... 32 @ 32¢
" 69... 32 @ 32¢
" 70... 32 @ 32¢

" 71... 32 @ 32¢
" 72... 32 @ 32¢
" 73... 32 @ 32¢
" 74... 32 @ 32¢
" 75... 32 @ 32¢

" 76... 32 @ 32¢
" 77... 32 @ 32¢
" 78... 32 @ 32¢
" 79... 32 @ 32¢
" 80... 32 @ 32¢

" 81... 32 @ 32¢
" 82... 32 @ 32¢
" 83... 32 @ 32¢
" 84... 32 @ 32¢
" 85... 32 @ 32¢

" 86... 32 @ 32¢
" 87... 32 @ 32¢
" 88... 32 @ 32¢
" 89... 32 @ 32¢
" 90... 32 @ 32¢

" 91... 32 @ 32¢
" 92... 32 @ 32¢
" 93... 32 @ 32¢
" 94... 32 @ 32¢
" 95... 32 @ 32¢

" 96... 32 @ 32¢
" 97... 32 @ 32¢
" 98... 32 @ 32¢
" 99... 32 @ 32¢
" 100... 32 @ 32¢

" 101... 32 @ 32¢
" 102... 32 @ 32¢
" 103... 32 @ 32¢
" 104... 32 @ 32¢
" 105... 32 @ 32¢

" 106... 32 @ 32¢
" 107... 32 @ 32¢
" 108... 32 @ 32¢
" 109... 32 @ 32¢
" 110... 32 @ 32¢

" 111... 32 @ 32¢
" 112... 32 @ 32¢
" 113... 32 @ 32¢
" 114... 32 @ 32¢
" 115... 32 @ 32¢

" 116... 32 @ 32¢
" 117... 32 @ 32¢
" 118... 32 @ 32¢
" 119... 32 @ 32¢
" 120... 32 @ 32¢

" 121... 32 @ 32¢
" 122... 32 @ 32¢
" 123... 32 @ 32¢
" 124... 32 @ 32¢
" 125... 32 @ 32¢

" 126... 32 @ 32¢
" 127... 32 @ 32¢
" 128... 32 @ 32¢
" 129... 32 @ 32¢
" 130... 32 @ 32¢

" 131... 32 @ 32¢
" 132... 32 @ 32¢
" 133... 32 @ 32¢
" 134... 32 @ 32¢
" 135... 32 @ 32¢

" 136... 32 @ 32¢
" 137... 32 @ 32¢
" 138... 32 @ 32¢
" 139... 32 @ 32¢
" 140... 32 @ 32¢

" 141... 32 @ 32¢
" 142... 32 @ 32¢
" 143... 32 @ 32¢
" 144... 32 @ 32¢
" 145... 32 @ 32¢

" 146... 32 @ 32¢
" 147... 32 @ 32¢
" 148... 32 @ 32¢
" 149... 32 @ 32¢
" 150... 32 @ 32¢

" 151... 32 @ 32¢
" 152... 32 @ 32¢
" 153... 32 @ 32¢
" 154... 32 @ 32¢
" 155... 32 @ 32¢

" 156... 32 @ 32¢
" 157... 32 @ 32¢
" 158... 32 @ 32¢
" 159... 32 @ 32¢
" 160... 32 @ 32¢

" 161... 32 @ 32¢
" 162... 32 @ 32¢
" 163... 32 @ 32¢
" 164... 32 @ 32¢
" 165... 32 @ 32¢

" 166... 32 @ 32¢
" 167... 32 @ 32¢
" 168... 32 @ 32¢
" 169... 32 @ 32¢
" 170... 32 @ 32¢

" 171... 32 @ 32¢
" 172... 32 @ 32¢
" 173... 32 @ 32¢
" 174... 32 @ 32¢
" 175... 32 @ 32¢

" 176... 32 @ 32¢
" 177... 32 @ 32¢
" 178... 32 @ 32¢
" 179... 32 @ 32¢
" 180... 32 @ 32¢

" 181... 32 @ 32¢
" 182... 32 @ 32¢
" 183... 32 @ 32¢
" 184... 32 @ 32¢
" 185... 32 @ 32¢

" 186... 32 @ 32¢
" 187... 32 @ 32¢
" 188... 32 @ 32¢
" 189... 32 @ 32¢
" 190... 32 @ 32¢

" 191... 32 @ 32¢
" 192... 32 @ 32¢
" 193... 32 @ 32¢
" 194... 32 @ 32¢
" 195... 32 @ 32¢

" 196... 32 @ 32¢
" 197... 32 @ 32¢
" 198... 32 @ 32¢
" 199... 32 @ 32¢
" 200... 32 @ 32¢

" 201... 32 @ 32¢
" 202... 32 @ 32¢
" 203... 32 @ 32¢
" 204... 32 @ 32¢
" 205... 32 @ 32¢

" 206... 32 @ 32¢
" 207... 32 @ 32¢
" 208... 32 @ 32¢
" 209... 32 @ 32¢
" 210... 32 @ 32¢

" 211... 32 @ 32¢
" 212... 32 @ 32¢
" 213... 32 @ 32¢
" 214... 32 @ 32¢
" 215... 32 @ 32¢

" 216... 32 @ 32¢
" 217... 32 @ 32¢
" 218... 32 @ 32¢
" 219... 32 @ 32¢
" 220... 32 @ 32¢

" 221... 32 @ 32¢
" 222... 32 @ 32¢
" 223... 32 @ 32¢
" 224... 32 @ 32¢
" 225... 32 @ 32¢

Black Paint, in oil... kegs, 5¢; assorted cans, 11¢

Blue, Prussian, fair to best... 40 @ 55¢
" Chinese dry... in oil... 45 @ 50¢

" Ultramarine... 18 @ 30¢
" Van Dyke... 15 @ 25¢
" Green, Patent American... 10 @ 12¢

" Dryers, Patent American... 15 @ 25¢
" Paris... in oil... 14 @ 18¢
" " in oil... good, 20¢; best, 30¢

" Iron Paint, Bright Red... 10 @ 12¢
" " Brown... 10 @ 12¢
" " Purple... 10 @ 12¢

" Ground in oil, Bright Red... 10 @ 12¢
" " Red... 10 @ 12¢
" " Purple... 10 @ 12¢

" Litharge... 2 @ 2¢
" Mineral Paints... 10 @ 12¢
" Orange Mineral... 10 @ 12¢

" Red Lead American... 10 @ 12¢
" Venetian (Kag) dry... 10 @ 12¢
" Indian Dry... 10 @ 12¢

" Rose Pink... 10 @ 12¢
" Sierra, American Raw, powdered... 10 @ 12¢
" " Burnt, powdered... 10 @ 12¢

" " Raw... 10 @ 12¢
" " Burnt, powdered... 10 @ 12¢
" " Raw... 10 @ 12¢

" Vermilion, Chinese... 10 @ 12¢
" " English... 10 @ 12¢
" White Lead, American, pure dry... 10 @ 12¢

" White

THE WEEK.

Baron de Lorme, whose name has been identified with certain schemes for building railroads in China, says he has completed the formation of an American company, as proposed, and will return to China via San Francisco as soon as various details can be arranged. He adopts the simile of Lord Palmerston, who compared China to an oyster which should be opened, using railroads as a knife.

On the occasion of the opening of the Jaffray Hospital, at Birmingham, the Prince of Wales will be presented with a key which is believed to be the finest ever made in England. It is in the style of the Queen Anne period, and is full of marvelous designs, the leading figure being that of Charity extending one hand to the needy, while the other holds the scroll of benefactions to the hospital. But what is perhaps most remarkable is that so unique an instrument should be capable of turning a lock.

Congress meets on Monday, December 7. General Logan is regarded in Washington as the coming president *pro tem.* of the Senate.

The façade of the Duomo in Florence having been restored and embellished, it is now proposed to cast in bronze the great doors of this cathedral. The Minister of Public Works offers \$1000 for the beginning of a public subscription.

Jay Gould and his son George will formally retire from Wall street December 31st, when the stock firm of W. E. Connor & Co. expires. Mr. Gould has been in stock speculation 25 years and now proposes to devote his energies to the management of the three corporations in which he is most largely interested. He says: "We will do our best for all of these properties, and let the street do what it likes with the prices. They are all doing well now. Missouri Pacific has no floating debt, and has \$40,000,000 of good securities on hand. The business of the Manhattan Elevated is growing constantly, and in order to meet the increased traffic we are lengthening out all the platforms on the Sixth and Third avenue lines, so that we can run five-car trains during the rush. We are negotiating now for an extension of the Second avenue line above the Harlem River, to meet the demands of the growing population there."

On the silver question among business men throughout the country the preponderance of opinion appears to be decidedly hostile to compulsory coinage. A committee of the Board of Trade and Transportation, of this city, recently sent out circular letters to representatives in all branches of trade in every city in the Western and Southern States, inviting brief expressions of opinion on this subject. Over 600 answers to these inquiries have been received, and from their perusal it would appear that ninety-nine out of a hundred are opposed to the Bland bill.

The National Museum at Washington contains 20,000 specimens of ores and metals.

The annual report of Mr. Dodge, the statistician of the Agricultural Department, for the present year, contains, the commissioner says, "a review of the course of agricultural production during 15 years, which shows an estimated increase in corn of 37,000,000 acres, or 80 per cent.; in wheat, of 20,000,000 acres, or 108 per cent.; in oats, of 13,000,000 acres, or 142 per cent.; in all cereals taken together, 67,000,000 acres, or 97 per cent. The enlargement of the wheat area was extraordinary during the period of partial failure of the crops of Western Europe; the extension of the breadth in maize was aided by the rise of the foreign trade in beaves and fresh meats, and by the sudden enlargement of exports of pork products, induced by the cheapness of corn, and the cultivation of oats has received special impetus from the seeding of rust proof varieties in the South, and from the necessity of less heating feed for horses than a too exclusive maize ration." The average estimated product of the principal food crops of the last five years is compared with the average of the ten years preceding, from 1860 to 1879, inclusive, showing an enormous annual increase in the aggregate as well as per acre.

King Alfonso, of Spain, died November 25, after a reign of 10 years. He was born November 28, 1857. The Queen at once accepted the resignation of Premier Castillo and called upon Señor Sagasta to form a Cabinet. Marshal Serrano died the next day, aged 75 years.

The Chicago Columbus Centennial World's Fair and Exposition Co. has been licensed by the Secretary of State of Illinois. Its capital stock is \$1,000,000, and its object is to hold an international exhibition in Chicago in 1892, in celebration of the fourth century of the discovery of America. The scheme includes the erection of a colossal statue of Columbus, "resting on a vaulted pedestal, in which will be deposited a history of each country participating."

The House Committee on Ordnance have ascertained, and so will report to Congress, that armor plates for ironclad vessels or fortifications, or steel ingots for guns of any desired size, can be obtained in this country. The plant is already on hand. All that is required is an appropriation by Congress. When this has been made, and an advertisement issued for the steel ingots or the completed guns and the armor plates, there are

several establishments ready and willing to undertake the contracts at prices as low as those offered by any European firms, less the cost of transportation to this country, but with the addition of the difference in wages. The commission will probably recommend that Congress make an appropriation for the manufacture of heavy ordnance.

The total amount of press telegrams, including the Associated Press service, sent over the Western Union Telegraph wires now reaches 1,000,000,000 words a year. The telegraph year for the transaction of business closes on July 30. In 1879, for the year there were transmitted of special messages 32,000,000 words; in 1880, 55,000,000; in 1884, 112,000,000; in 1885, 120,000,000. The steady growth of the special service shows the degree in which the leading newspapers are coming to rely on gathering their own news. There has been a great change in the rates for service. In 1879 the average was \$1.87 per 100 words; now it is 57 cents per 100. In England, where the distances are short, the average rate on special dispatches is 1/2 cent a word.

A leading Mormon boasts that Utah Territory is the only portion of the American Union that is out of debt. The total tax in the improved portion of Salt Lake City, where there is a paid fire department, police force, pavements and all modern improvements, is only 17 mills on a 50 per cent. valuation. This includes the city, county, Territorial and school tax—everything.

It is stated that the directory of the Northern Pacific Railroad has given orders for the completion of the Cascade Division of that road. It will extend from Cascade to New Tacoma, W. T., and complete the Northern Pacific from Duluth to the Pacific Ocean.

At the National Cattle Growers' Convention, held in St. Louis last week, a representative tanner affirmed that hides were damaged to the amount of \$1,000,000 per annum by reckless branding.

Judge Learned, of the Supreme Court, in Albany, denied the motion of the New York Central Railroad to dissolve the injunction restraining that company from guaranteeing \$50,000,000 bonds for the West Shore Railroad and from perfecting a lease of the West Shore for 400 years, the railroads named being parallel lines that cannot be consolidated. Moreover, the charter of the West Shore road is for 100 years only; consequently, it cannot be leased for 400 years.

R. Johnson Niven, of this city, who died in Southampton, England, a few days ago, had for many years the practical management of the New York and Harlem Railroad, and was one of the most active spirits in the construction of the Fourth avenue tunnel and the Spuyten Duyvil Railroad.

Recent reports of the deepening of the channel at Sabine Pass are very favorable. The Government has so far appropriated \$500,000 for the work, and the water on the bar has been increased from 6 to 10 feet. The plan of improvement adopted is similar to that put into effect at the mouth of the Mississippi. The jetties are constructed of stone and brush mattresses. It is proposed to make them about 3 1/2 miles long. The distance between them is 2200 feet. Owing to the swiftness of the current it is considered only a matter of time to give from 20 to 30 feet of water at the mouth of the pass and on the bar. The total estimate for the work is \$2,000,000. Sabine Pass is the outlet to Sabine Lake, which is an enlargement of the Sabine River, the stream separating Texas and Louisiana.

The case of Cyrus Field, of New York, against James Gordon Bennett, of the New York Herald, and his agent in London, for a libel in that paper, came up in Court of Queen's Bench, London, November 18, when Justice Manisty decided that the interrogatories were oppressive, were too wide and searching, and could not be allowed. The defendant denied agency, denied knowledge of the libel and denied publication. This position was sustained.

A bill authorizing the enlargement of the Erie Canal at a cost of \$2,000,000 will be presented to the incoming Legislature of this State, by a committee representing leading trade organizations, of which Horatio Seymour is chairman. This bill provides for the deepening of the canal 1 foot, the raising of its banks 1 foot, and the lengthening of its locks to the size of that recently constructed at Geddes. These improvements, it is believed, will enlarge the usefulness of the canal and permit a vast increase of its commerce. The lengthening of the 76 locks alone, it is thought, will enable canal-boats to make double the number of trips they now make yearly between New York and Buffalo, and the deepening of the ditch will admit of the use of larger boats. With these improvements boatmen predict that steam canal-boats will take the place of those drawn by horses.

Among the applications to be made to the Canadian Parliament at the coming session will be one for a bill incorporating a company to construct an iron tubular subway between Cape Traverse, on Prince Edward Island, and Cape Tormentine, on the main land of New Brunswick. The author of this scheme is a Canadian Senator, who says that experienced engineers have pronounced the project feasible. The distance between the two points is 9 miles and the greatest

depth of water is 6 fathoms. It is proposed to build an iron subway 18 feet in diameter, through which railway cars can be moved by means of engines stationed at each end.

Property on the south shore of Staten Island has suddenly risen in value since the announcement of the Baltimore and Ohio's contract with the local railroad company for a traffic connection.

Professor Langston, late minister to Hayti and San Domingo, has just returned from those islands to urge upon the United States Government the ratification of the reciprocity treaty pending between the countries. The great product of the island is sugar, which the planters desire to lay down here in the raw or unrefined state as cheaply as possible.

The change made by the Mexican Congress in the tariff laws of Mexico is regarded by the merchants of El Paso and other towns on the Rio Grande border as highly beneficial, enabling Mexican merchants to import goods and store them in warehouses and subsequently ship them to interior points. A number of commodious warehouses will be erected in El Paso to accommodate the increased trade.

Russia is engaged in draining the Pinsk marshes, which have an area larger than Ireland. Up to the present time about 4,000,000 acres have been reclaimed, of which one-half is susceptible of cultivation. Besides digging 120 miles of canals, the engineers have built 179 bridges.

Dakota at the coming session of Congress will again demand admission as a State. Washington Territory and New Mexico will also ask for admission.

The valuation of the State of Massachusetts, as reported by the assessors of cities and towns to the Secretary of State, shows a net increase of \$25,469,365 over that of the previous year. The increase on real estate was \$29,541,187, and the decrease on personal property was \$4,071,822. The total of real and personal property is \$1,782,349,143, an increase of nearly \$200,000,000 during the past five years. The personal property assessed amounts to \$494,355,244, on which the tax is \$6,644,748, real estate paying the balance of \$19,205,569.

Edward Learned, of Massachusetts, whose proposed railroad across the Isthmus of Tehuantepec was stopped by the forfeiture of their land grant to the Mexican Government, is a firm believer in the practicability of a canal between the two oceans, which are only 165 miles separate. He says: "It would require a stretch of 8 or 10 miles of solid masonry on the summit, into which it would be necessary to pump water to make up for evaporation, which is a big item in the tropics, and for the lockages. But in this day of Croton aqueducts that is a mere trifle. What this country ought to have is a treaty right over a strip of territory there, say 50 miles wide. We should also have a fortress and naval station at Cape Catoche, on the outmost point of Yucatan. We have already one great defense of the Gulf of Mexico at the Dry Tortugas. With a fort at Cape Catoche the Gulf would be a land-locked sea, and we would be able to protect the Mississippi and its tributaries from any foreign invasion. With a ship canal at Tehuantepec we could protect California and Oregon and become absolutely unassailable. Besides, the canal would bring us all the trade of England that now goes to the East around the Cape of Good Hope or by the Suez Canal."

Fully 75 per cent. of the export trade of Antioquia, United States of Colombia, is with the United States, but the imports consist chiefly of manufactured cottons from England, which have the preference on account of the long credits given and better adaptation of the goods to the requirements of the market. Nevertheless, our consul at Medellin says there is a good field there for American goods.

Thomas A. Hendricks, Vice-President of the United States, died suddenly November 25, of heart disease, at his home in Indianapolis. The Senate will be called upon at its first session to elect a president *pro tempore*, who becomes acting Vice-President. Mr. Hendricks was 66 years of age.

The Secretary of State has received, through the Siamese consul in New York, the ratification of the treaty recently concluded for the regulation of the traffic in liquors. It prescribes the conditions upon which Americans may import liquors into Siam and sell them. The ratification bears the signature in Siamese characters of King Chulalongkorn.

While several workmen employed at the Rison Iron and Locomotive Works, in San Francisco, were engaged in hoisting a heavy casting, the derrick chain came in contact with an electric-light wire, the current of which was transferred to the chain, causing the instant death of one of the men.

An earthquake in the city of Leon, Nicaragua, not remote from the route of the proposed canal, demolished a church edifice and several lives were lost.

The Mechanical Institute and Technological School, in Rochester, N. Y., was opened last week. It is a free school, and over 400 pupils have already registered. Prof. S. A. Lattimore, of the faculty of the

Rochester University, is the president. The school is supported by leading Rochester manufacturers and educators.

Thousands of cars of wheat are accumulated on the rail-tracks at Minneapolis, where fully 6,000,000 bushels are stored in the elevators, nearly up to their full capacity.

Californians are cheered by the recent heavy rains, and farmers are now seeding the earth for the harvest of next year, which promises to exceed in breadth and yield any previously gathered.

The sale of Goring's shipyard, on the Delaware, was announced for the 2d inst. The American Shipbuilding Co. were organized early in 1883, with an authorized capital of \$1,000,000, of which \$300,000 was paid in. Commander Goring, of the United States Navy, who had just landed the Egyptian obelisk in New York, was elected president. In March, 1884, the company failed, with debts amounting to \$250,000. Goring was appointed receiver, with instructions to finish the ships the company were under contract for. This he did, and very soon after he was taken ill and died. He incurred in the completion of the vessels additional debts which take the precedence over all other claims in the settlement of the affairs of the company. In April, 1885, John W. Hoffman succeeded Mr. Goring as receiver in the interest of the creditors. He has since been winding up the affairs of the company. At least \$500,000 has disappeared and is not likely to be recovered.

The tonnage on the Northern lakes is some years in advance of requirements. The past 10 years have been adding ships of increased tonnage, some as high as 3000 tons, or, say, 100,000 bushels, and very few below 1700 tons. In capacity this gives a very large fleet in a few ships compared with those of 20 years ago, which had an average capacity of 30,000 to 35,000 bushels. There are some 50 boats running in connection with lines of railroads, taking nearly all the freight offering.

The Louisiana rice crop up to date results in 260,000 barrels cleaned, being double that of last year.

A fire which broke out in Smith & Jepson's hardware store, in Savannah, N. Y., destroyed half the village.

The property in Buffalo known as the Geo. B. Hays Foundry has been leased for a long term of years to a number of capitalists, including the Buffalo Car Mfg. Co. and Buffalo Car Wheel Works, who will organize a stock company and on February 1 begin the manufacture of cast-iron water-pipe and special castings on a large scale.

Glowing accounts have been received from the gold fields of Alaska. A Government officer reports that he saw \$400 taken out of a rocker in a single afternoon by two men, and that several claims are yielding from \$250 to \$400 per day.

Governor Squire, of Washington Territory, in his report to Secretary Lamar, gives the population of the Territory as 129,438, an increase of 36,930 in two years. The assessed value of property is \$50,484,437. The Chinese residents in the Territory number 3276.

The war in Burmah is virtually ended and another Province is added to the British India Empire. King Thebaw acceded to the terms demanded, and the Ava forts, with 28 guns, were turned over to the British troops. A garrison was placed there and the British troops proceeded to Mandalay November 28th.

According to the latest official statement published by the authorities of Russia there are in that country not less than 14,000 square miles of oil-producing land, but of this vast territory the field at Baku is the only one worked, and even this covers only the limited space of some 3 1/2 square miles. The output is enormous. The residuum of the refiners is all used as fuel for steamers and railways.

The spectacle of a little man under a hat too big for him is only ludicrous, but the sight of a young country like Canada laboring under a debt of nearly \$300,000,000 is too serious to be amusing. So says the Toronto Truth.

The Special Water Commission of Albany, N. Y., unanimously recommend the adoption of the driven-well system on the sand plains north of the city, at a cost of \$450,000 for furnishing the 1,000,000 gallons daily.

Large numbers of Italian laborers are going South from Pennsylvania, attracted by offers of from \$1.25 to \$2 per day.

The steamship Louisiana, of Cromwell's Line, made her last trip to New Orleans, a distance of 1781 miles, in 5 days and 7 hours, on an average of less than 58 revolutions per minute, and the amount of coal burned was less than 200 tons. This steamer is capable of making the trip to New Orleans and back to New York, a voyage of about 10 days' steaming, on the amount of coal that is consumed in one day on the Etruria, Oregon or Aurania, making nearly the same speed, and carrying three times as much cargo. The Marine Journal says: "With such results constantly before those engaged in water transportation, we are at a loss to understand the advantage to be obtained by

building steamships in England. The amount saved in the price of labor, if a high rate of speed is desired, would go into the furnaces in fuel and out of the stack in gas and smoke the first six months."

The use of natural gas as fuel has led to the manufacture of mirrors in Pittsburgh. Up to this time all mirrors manufactured in the United States have been from imported glass. The quality of the glass to retain the silvering and give a perfect reproduction of the object must be of the best. This quality Pittsburgh has never been able to produce until natural gas came into use. Now by its aid the fineness of the glass produced rivals that of the imported article. The entire absence of impurity, the perfect fusing of the ingredients, the rapidity of the melting, and the pure, intense flame for reheating or working, are the principal advantages.

A new British campaign in Egypt is in contemplation to check the advance of the Mahdi's successor. A force of 6000 men will be reinforced by a Nile flotilla.

Capt. Alva Bradley, the largest shipowner on the northern chain of lakes, died last week in Cleveland. He was 71 years old, and owned at the time of his death a fleet of 32 vessels.

In St. Louis plans have been adopted for an Odd Fellows' hall, to be fire-proof and have a front of 126 1/2 feet on Olive street, and to cost, exclusive of the machinery and lighting, \$300,000.

The removal of the impediments to the navigation of the Danube at the "Iron Gate" is to be carried out at last, in conformity with the stipulations of the treaty of Berlin. The Hungarian Government has decided to have the work executed. The cost is estimated at \$6,000,000.

The immigration returns for November, compiled at Castle Garden, shows 17,034 arrivals, as against 18,279 for the corresponding month last year.

The Creil Experiments in the Transmission of Power by Electricity.

The startling and considerably distorted cable advice as to the latest experiments undertaken by M. Marcel Deprez between Creil and Paris, on the transmission of power by electricity, have caused some curiosity. M. Deprez's paper embodying the main data, read before the Academy, has now been received. The length of the telegraphic line connecting the two stations is 56 km. (35 miles), but, as the return of the current does not take place by the earth, it is really obliged to traverse a line of 112 km. of copper cable, equivalent in section to a single wire of 5 mm. in diameter. The total electric resistance of this cable at the temperature of 15° C. is 100 ohms. The generating machine is at Creil. It has two rings revolving in two distinct magnetic fields, each composed of eight electro-magnets. Each ring has a resistance of 16.5 ohms and an external diameter of 0.78 m. The current produced by this machine was utilized at La Chapelle by two receiving machines, situated at some hundreds of meters from each other. Only one of these receivers is at present completed. It possesses, like the generator, two rings; they have each 0.58 m. exterior diameter and an electric resistance of 18 ohms. The experiments began on October 17 took place on a looped circuit—that is, the generating and receiving machines were placed side by side, as took place in the experiments made in March, 1883, in the works of the Railway du Nord, by a commission nominated by the Academy.

The following are the results of one of the experiments of the commission, and of another experiment made two days afterward in the presence of M. Sarrailh, sub-inspector of the Northern Railway of France, and engineer delegated by the commission of experiments:

FIRST EXPERIMENT.			
	Generator.	Receiver.	
Speed in revolutions per minute	190	218	
Electromotive force, direct or inverse	5,469 volts.	4,342 volts.	
Intensity of current	7.21 amp.	7.21 amp.	
Work in magnetic field (in horse-power)	9.20	3.75	
Electrical work (in horse-power)	53.59	41.44	
Mechanical work measured with the dynamometer or the brake (horse-power)	62.10	35.10	
<i>Efficiency.</i>			
Electrical		77.5	
Industrial mechanical		47.4	
SECOND EXPERIMENT.			
	Generator.	Receiver.	
Speed per minute	170	277	
Electromotive force	5,717 volts.	4,441 volts.	
Intensity of current	7.30 amp.	7.30 amp.	
Work in magnetic field	10.30	3.90	
Electrical work	55.90	43.4	
Mechanical work (measured with the dynamometer or the brake)	61	40	
<i>Efficiency.</i>			
Electrical		78.5	
Industrial mechanical		53.4	

It will be seen that a useful work of 40 horse-power has been developed by the receiver with an industrial yield of 50 per cent, the speed of the generator being only 170 revolutions per minute, and that of the receiver 277. The electromotive force of the generator was about 5700 volts. In other experiments it has exceeded 6000 volts. These machines, therefore, develop considerable electromotive forces with very low angular velocities. It will be remarked, also, that the receiver, though having rings of only 0.50 m. in diameter, and being traversed by a current of only 7 amperes, developed a useful mechanical work of 648 kg. m., without any appreciable heating. These are conditions which, according to M. Deprez, hitherto have not been realized.

100

MECHANICAL.

New Foot-Lathe.

The Seneca Falls Mfg. Co., of Seneca Falls, N. Y., are calling attention to a new Foot-Lathe which they are just introducing and which they have named the Union. This lathe, which they state has many new and valuable features, is intended for practical use in the workshop for turning in wood or metals; also for boring, drilling, polishing and other similar purposes. The makers direct attention to the design, which shows a strong, durable and thoroughly built machine. The entire machine is of iron and steel with the exception of the stand-top, which is of hardwood neatly finished. The treadle motion is



The Union Foot-Lathe, Built by the Seneca Falls Mfg. Co.

peculiar, and is claimed to be the most powerful that has ever been offered with a foot-lathe. Double treadles are employed, which makes possible a walking motion. The treadles are movable and work independent of each other. They are connected on opposite ends of the driving-wheel shaft in such a manner as to produce a strong, positive and continuous power. In addition to these advantages the tool can be started or stopped instantly, and may be operated, while sitting, with both feet; or, when standing, with one foot, as may be required. The driving-wheel is of sufficient weight for all ordinary purposes and is 26 inches in diameter. A 1-inch flat belt is used and two speeds are provided for. The headstock has a hollow steel spindle with

A New High-Speed Engine.

An English novelty in the line of high-speed engines is a small engine built by Messrs. Welford Bros., of Sunderland, and illustrated in the annexed engravings. It consists of two inverted cylinders *b b*, with long pistons *d d* connected by rods *e e* to a double-cranked shaft, with the cranks 180° apart. The feature of novelty lies in the arrangement of the valve and the means by which it is driven. As the two cylinders are always in opposite phases of operation, one beginning to exhaust just as the other receives its steam, a single valve, *k*, is sufficient for both; this valve works in a horizontal plane on the cylinder covers, and is actuated by a constantly rotating shaft, *g*, which carries at its upper end an eccentric working between phosphor-bronze fitting

fice, are some of our present foremost engineers. With such a vast number of rotary engines there is a great variety in the shapes and dispositions of the parts of which they are composed. Some of them have rectangular pistons, others have that part which corresponds to the piston in the shape of an eccentric cylinder. Circular pistons depending for their steam-tightness upon centrifugal force, pistons in the form of a sphere, sections of a sphere, inclined planes, have all been adopted. The chamber in which the piston works is shaped to correspond with the particular kind of piston used, and is further complicated by having to be formed so as to provide for the necessary steam and exhaust passages. In the most recent types of these peculiar engines no step toward lessened complication seems to have been made. The Tower engine, besides bewildering one with the strange movement of the piston, discourages the investigator with a piston composed partly of spherical surfaces, partly of inclined and partly of fair surfaces, adhering to which is a collection of pin joints for fastening up to the constrained pieces. The Fielding engine appears as a cursory examination of its interior to be a strange-looking kind of cobra contorted into complicated coils. Here, however, the piston-piece is composed of a collection of four pistons proper, the working surfaces of each being of double curvature, fitting into a chamber of corresponding form.

In the majority of cases—in fact, in all cases until recently—this great fertility has not been attended with any useful result. Practical engineers and men of general science were therefore naturally curious to know what could be the reason that so much ingenuity and zeal should be so constantly foiled in the endeavor to solve a problem at the first sight of such easy solution. Although at first this could not be very well accounted for, many writers, taking experience for their guide, denounced the undertaking as impracticable, their chief point being that it was uniformly attended with too much complication of internal parts, which rendered it impossible to make a secure and durable joint. In this spirit Bourne, in writing of rotary engines, speaks lightly of their originators, and alludes to their notions of the “imaginary imperfections of the direct-acting engine.” Another writer, eminent on the philosophical side of the question, Reuleaux—to whom and to whose translator, Professor Kennedy, we are indebted for much excellent information bearing on this matter—in his articles on the subject denounces the engines as “useless machines that have been the means of wasting much capital and thought,” and puts aside their designers gently, but firmly, as “would-be inventors that have been warned again and again.” Such discouragement as this, coming from philosophers and engineers, is sufficient to cause any man of inventive ability to hesitate; and such opinions, coupled with a knowledge of the results of actual experience, would certainly have left the field to waste if it had not been for the discovery of a new quality in the rotary engine, and a new demand for that special attribute. Whether true or not, this class of engine seems to have the property of running at great speeds at moderately small powers; and this action is exactly that required for generating electricity for lighting purposes. With this fresh object inventors have returned to the old problem with greater eagerness and hope than ever, and the result has been the production of wonderful specimens of ingenuity, among which are a number of engines of practical use for driving dynamos.

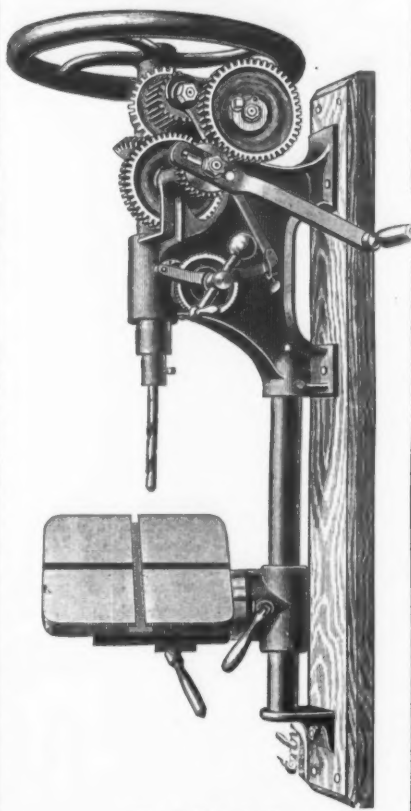
It is the general opinion that in a rotary engine, as the object desired is a more direct application of the steam in turning the shaft, they must therefore necessarily be of a simple construction. The ordinary reciprocating engine is looked upon as a circuitous way of arriving at the desired end, and, although even in apparently neat rotary engines there is always a difficulty of keeping the many internal rubbing surfaces steam-tight, it is supposed that this mere practical side of the question will be met when metallurgy gives us an unwearable material and engineering a perfect joint. It is, however, an entire mistake to suppose that any engine worked by a pressed fluid, such as steam, compressed air, coal gas or water, can be made which can possibly work without a reciprocating movement; as also it is to suppose that any reduction in the number of working parts takes place below that used in the simple cylinder engine without destroying its efficiency. Some time has elapsed since these facts were foreshadowed by many engineers, and definitely enunciated by Reuleaux, and yet we find persons who are either unacquainted with them or disposed to disagree with them. The chairman at one of the meetings of the British Society of Arts, held for the purpose of listening to an excellent paper on the development of machinery, said it was a standing disgrace to mechanical science that it had to have recourse to a reciprocating movement when it wished to end with a rotary one. This opinion, we think, must have been hastily offered, for if the eminent speaker had directed special attention to the matter, had considered closely any of the vast number of engines professing to produce rotary motion direct, and that which had been written upon this point, he would have seen that no fluid-pressure engine exists which has not a reciprocating movement, either relative or absolute, and which has not, if complete, the same number of working parts in its composition as the much-despised ordinary cylinder engine. Even the inventors of rotary engines seem disposed in many cases to think they have done away with the reciprocating movement, and, however plainly the action occurs in their combination, they tacitly ignore it, as though it were something to be ashamed of.

The Bailey Drill.

What is known as the No. 5 Bailey Drill, shown in the annexed cut, is a simple, strong and durable machine, and will drill up to 1½ inches. An extra heavy balance-wheel, running on a vertical bearing, causes the drill to run very easily. The feather which holds the balance-wheel to the spindle being 6½ inches long prevents all liability of defacing the spindle, as is the case with short feathers. The entire spindle is made of

polished steel, and runs in a sleeve bearing 9 inches long; this gives it great steadiness and prevents the spindle from being worn and becoming loose. The spindle is fed up or down by a worm working in a rack upon the spindle sleeve, and is operated by the feed handle.

The self-feed may be used or not, as desired, by simply raising or dropping the feed-dog, and can easily be changed to slow or

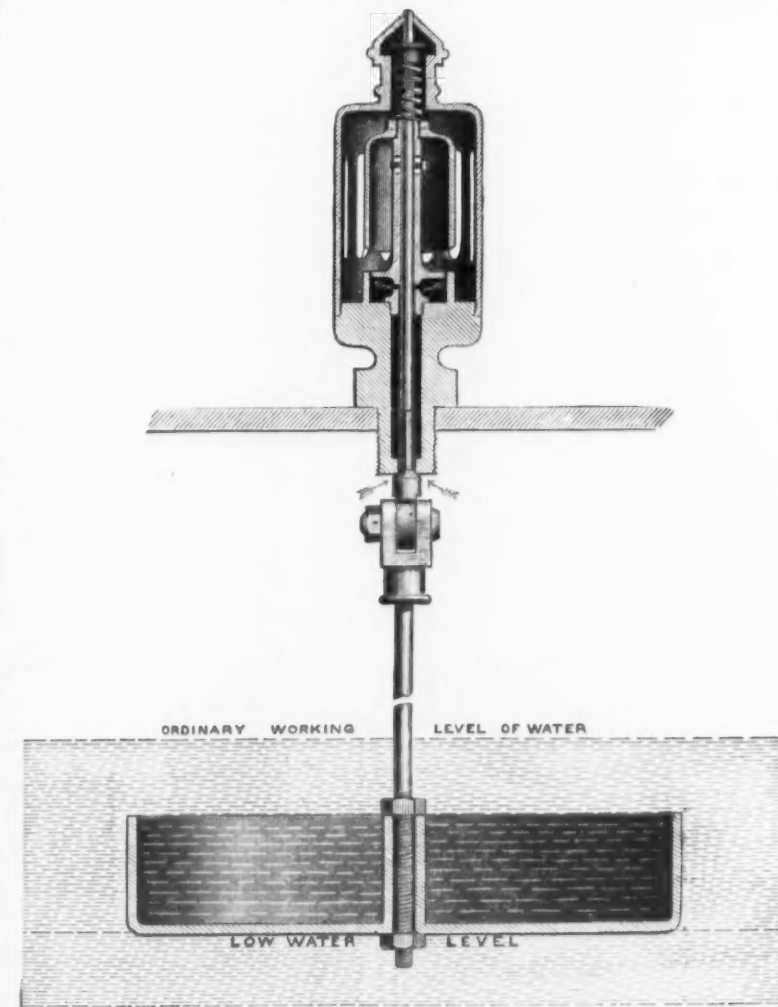


The Bailey Drill.

fast feed. Fast or slow speed may be obtained by sliding the large spur-gear backward or forward. The table may be fastened at any point on the column, and can be adjusted to any desired angle convenient to the operator. The work can be clamped to the table the same as on power drills. The drill is made so that it can easily be turned into a power-drill by attaching a sleeved stud with bevel pinion and pulleys on opposite side of crank. Every drill is set in perfect line and tested before shipping. The Illinois Iron and Bolt Co., of Carpentersville, Ill., are the builders.

Kenyon's Low-Water Alarm.

The Kenyon Low-Water Alarm, of which we show a sectional view, seems to be a reliable little attachment guarding against low water in steam boilers and the resulting dangers and injuries. The cut fully explains its arrangement and method of working. When the water falls below the proper level the trough, which under ordinary working conditions is submerged, entraps the water



Section of Kenyon's Low-Water Alarm.

and acts as a fluid dead-weight. This overcomes the resistance of the spring above the whistle, the spindle falls away from the seating, and the steam issuing in the direction shown by the arrows sounds the alarm, which is not silenced until the water has been restored to the proper level. The alarm can at any time be tested simply by pressing down the spindle which projects through the guard. The outer casing can, moreover, be securely fastened, so as to prevent tampering with the apparatus. The whole arrangement can be easily applied, is positive in its action and of extreme simplicity, circumstances which are well calculated to secure its favorable consideration. The alarm is

made by the Salamander Grate Bar Co., 110 Liberty street, New York.

Turret-Head Chucking Lathe.

In our issue of July 9 of this year we supplied an illustrated description of a 20-inch turret head chucking lathe built by the Bridgeport Machine Tool Works, of Bridgeport, Conn. The same works are now turning out a machine of similar design, but intended for heavier work. It has a 6½-foot bed, swings 33 inches over bed, and is powerfully back geared. The spindle is of forged steel, and the main journal 52½ inches in diameter and 5½ inches long. The hole through the spindle is 1½ inches in diameter. As in the smaller machine, the turret is self-revolving, and is furnished with automatic feed and stop motion. It is 9½ inches in diameter and has six holes 1½ inches in diameter. The movement of the turret slide is 12 inches. The cone has four steps for 3-inch belt, the largest step being 14 inches in diameter. The New York office of the Bridgeport Machine Tool Works is at 14 Day street.

Another large gas well has been struck in the New Sheffield district, about 14 miles from East Liverpool, Ohio. The Chartiers Gas Co., who supply Pittsburgh with about one-third its natural gas, have been drilling there for some time, and when the drill reached the gas it came with such force as to throw the tools out of the hole and over the derrick, which is about 75 feet high. After the excitement had subsided among the employees a test was made, and it was found there was a pressure of 480 pounds to the square inch. This makes it one of the largest wells ever struck. The Chartiers Gas Co. have made a proposition to consolidate with the Ohio Valley Gas Co., and at once lay pipes and conduct the gas from this well to the potteries at East Liverpool, getting the pipes under ground as soon as possible. The Ohio Valley Gas Co. have the matter now under consideration, and will determine whether they will accept or not as soon as a meeting is held. If they do, it will hardly be 60 days before East Liverpool has an additional supply of natural gas sufficient for all purposes. This one well would supply every pottery, as well as every dwelling, with light and fuel and not use half the gas. There is a strong probability that the companies will be consolidated.

The United States consul at Ottawa calls attention to the fact that for several years past Canadian phosphate has been shipped to England and Germany, where it is crushed and adulterated and reshipped to the United States. Here it is sold at a lower rate per ton than was paid for it in Canada. He quotes Canadian geological reports, showing that as matter of fact Canadian phosphate is sold in the United States for fertilizing purposes after it has made two voyages across the Atlantic; that of 21,000 tons imported into the United States last year only 221 tons came direct from Canada, whereas the output from this country was more than sufficient to supply the whole American demand.

An African explorer, H. H. Johnson, in an account of a journey to Kilimajaro, de-

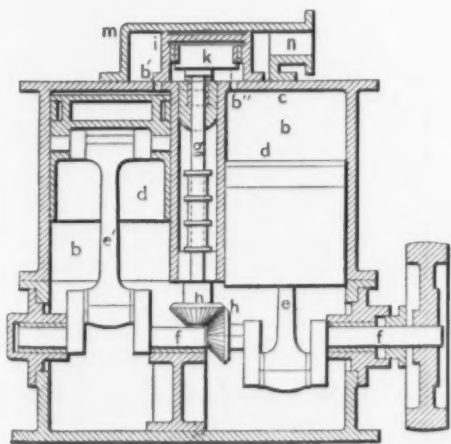


Fig. 1.—Longitudinal Section.

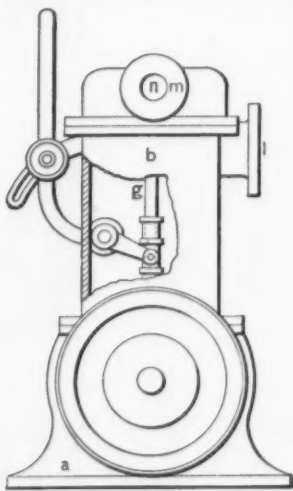


Fig. 2.—Side View, Showing Reversing Gear.

A NEW HIGH-SPEED ENGINE.

bra-s boxes made adjustable to take up the wear. The tailstock has a steel screw spindle with lever and hand-wheel. The centers are fitted to Morse twist drills No. 1 taper. Two sizes of this tool are made, both with 10-inch swing, one being 24 inches between the centers, and the other 36 inches between centers. Extra attachments are also provided for use with this tool when required. Among these may be mentioned a compound slide rest which is very desirable for working in metals. By its use straight or tapering turning may be done and work may be faced or the surfaces squared up to the full capacity of the lathe. It is provided with two slides placed at right angles with each other, carrying a tool-post which can be drawn back and forth or moved sideways by means of screws. This adjustment allows any position for the turning tool. A beveled rest is also provided which allows the vertical adjustment of the tool without altering its pitch. The cross-feed is 2 inches and the horizontal feed 6 inches. The tool-post, screws and gibs are steel, and the traverse screws are covered. A circular-saw attachment is also provided, adapting the tool for ripping, cross-cutting, mitering and the like. The table of this attachment is 15 inches long by 12 inches wide, and is provided with two adjustable guides which move in slides at right angles with each other, one of which has a mitring attachment. The table has a vertical adjustment of 2 inches. One end of the saw-arbor screws on to the head-spindle, while the other runs on a dead-center,

part by raising the sleeve which connects the two. Within this sleeve there is a stud which takes into a helical groove in one part

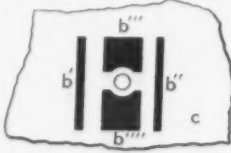


Fig. 3.—View of Valve-Seat.

of the shaft, and thus the endwise motion of the one part effects the rotation of the other.

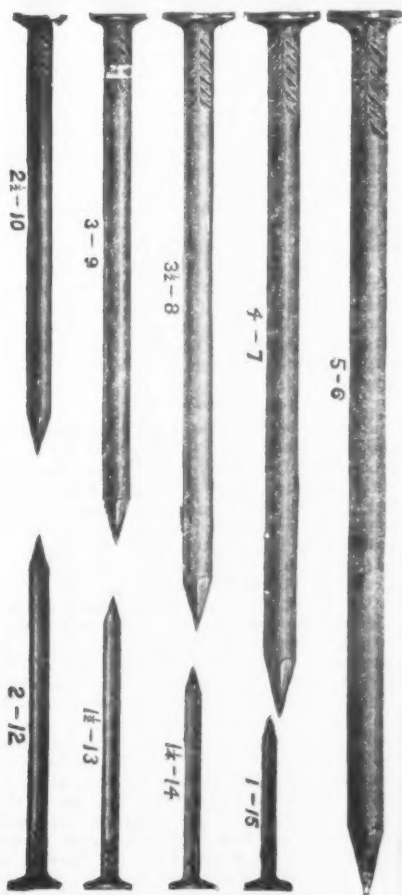
Rotary Engines.

Speaking of rotary engines, the London Engineer of recent date supplies some interesting matter, from which we extract the following:

Watt and his pupil Murdoch produced a number of practical methods, and, though none of their productions were capable of pushing aside the original pattern, each of these able mechanical engineers seemed to think that some kind of rotary engine would eventually be introduced and universally adopted. Hundreds of inventors since their time have devised and patented hundreds of engines, and among those who could not resist the attractiveness of the subject, but have not pursued it as far as the Patent Of-

THE HP NAIL CO.,

CLEVELAND, OHIO,



MANUFACTURERS OF

WIRE NAILS

OF ALL KINDS.

Barbed or Plain Steel, Iron and Brass Nails, Cast Steel Wire Brads, Cast Steel Wire Finishing Nails, Cigar Box Nails, Es cutcheon Pins, Wagon Nails, Clinch Nails, Hinge Nails, Wire Spikes for Track, Bridge and Dock Work, Tinned Nails, Galvanized Nails.

**DYNAMITE**

FOR ALL KINDS OF BLASTING.

CAPS. FUSE

AND ALL

BLASTING SUPPLIES.

Write for Illustrated Pamphlet. Mailed free. Agents wanted.

AETNA POWDER CO.,

98 Lake St., Chicago.

Samson Jack & Press Co., Black River, N. Y.

MANUFACTURERS OF
WAGON JACKS.



Made entirely of the very best malleable iron. They will not break, and, properly handled, will give out of repair. Also Manufacturers of Hand Power Presses of Every Description. Send for Catalogue and Price.

**Perfection Oil and Molasses Gate.**

Seven Sizes. Warranted to draw any fluid, from the thickest molasses to the lightest kerosene, without adjustment. No packing to wear out. No set screws to break off. Self-adjusting. It is simply perfect. Catalogues free. Hardware Specialties and Tools. GRAVES & MOORE, 112 Chambers St., New York.

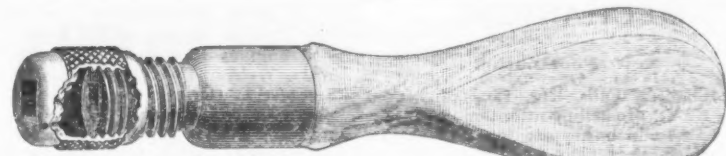
A New Ash Sifter.

We doubt if any article has been shown to the House-Furnishing Trade during the past ten years that is so much needed, so attractive in sight, so satisfactory to operate and so easy to sell as our new BLANCHARD ASH SIFTER. It is instantaneous, automatic, simple, convenient, durable; has no moving parts; is noiseless, dustless, economical, easy to operate and cheap. What more do you want? Samples sent to any part of New England, freight paid, on receipt of retail prices. Send for descriptive Circulars to the sole manufacturer.

PORTER BLANCHARD'S SONS., Concord, N. H.

BUSHNELL'S PATENT STAPLE

THE BEST MADE.
ANY SIZE, EITHER FLEAM OR SQUARE POINTED
SEND FOR PRICES.
NEW HAVEN STAPLE WORKS,
NEW HAVEN, CONN.

**BALZ PATENT TOOL HOLDER.**

Will hold any tool designed for the bit-stock. Manufactured by
SYRACUSE TWIST DRILL CO., - - - **SYRACUSE, N. Y.**

**WM. H. HASKELL CO.,**

MANUFACTURERS OF

GIMLET POINTED

**COACH SCREWS,
MACHINE BOLTS,**

With Round, Square and Hexagon Heads,

PLOW AND CULTIVATOR BOLTS,

TAP BOLTS,

Milled Cap Screws and Set Screws, Clinch Rings, Cold Punched Square and Hexagon

NUTS,

CLEARER SPRINGS, CHAIN LINKS, LEVERS AND STIRRUPS, RODS, BOLTS, AND

IRON WORK FOR BUILDINGS.**HENRY B. NEWHALL CO., Agents,**

105 Chambers St., New York

47 Pearl Street, Boston.

OFFICE AND WORKS

277 MAIN STREET,

PAWTUCKET, RHODE ISLAND, U. S. A.

**Burrall Improved Corn Sheller,**

RIGHT HAND.

Wrought Shafts, Wooden Legs; separates cobs from shelled corn. *Cyclone Cutters*, the best for dry fodder or ensilage; *Copper Strip Cutters*; *Lever Cutters*, very good and cheap; *Root Cutters and Shredders*. Special prices on application.

THE NEW YORK PLOW CO.,

55 Beekman St., New York City.

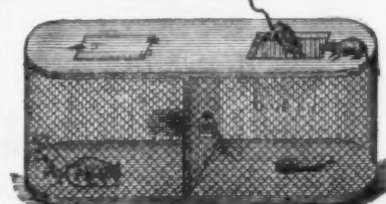
SMALL CASTINGS.

WARRANTED SOFT, CLEAN, SMOOTH.

LOW PRICES

**LARGE CONTRACTS****Springfield Foundry Co.** 93 LIBERTY ST., Springfield, Mass.**The "BOSS" Trap.**

The Only Rat Catcher.



Noiseless, Self-Setting, Always Ready, Easily Cleaned.

For sale by the leading Hardware, Stove and House-Furnishing Goods houses in the United States. Manufactured by

J. B. KENDALL,

Washington, D. C.

DILLON NUT LOCK

PATENTED ENTIRELY NEW

The only nut lock based on Mechanical Principles. Can be used in any place where a jam of nut lock is needed. For full information and prices, address

DILLON NUT LOCK CO., 185 W. Pearl St., Cincinnati, O.**NEW ENGLAND SPECIALTY CO., North Easton, Mass.**

MANUFACTURERS OF
Leavitt's Improved Screw Driver (Patent Applied for). Leavitt's (Pat.) Common Sense Can Opener. Sheet Metal Punching of all kinds to order.

TACK AND SHOE NAIL MACHINERY.**WM. A. SWEETSER**

Brockton-Mass.

THE INTERNATIONAL RESOLVENT.

The Concentrate Tannin Antidote to Scale and Foam in Steam Boilers.

Recognized by the highest authorities as the true and silent Solvent and Preventive. Free from every objection. In bulk from extensive works at source of supply. More of the active principle for the cost than possible in any other. Full guarantee to remove ALL scale and to prevent foam in any boiler with any water. Purely vegetable and harmless.

SEND FOR CATALOGUE AND PRICES TO

INTERNATIONAL MFG. CO., 272 Pearl St., Cleveland, Ohio.

BRANCH OFFICES

15 Wabash Ave., Chicago, Ill.

96 Fifth Ave., Pittsburgh, Pa.

J. W. Swann, Dallas, Tex.

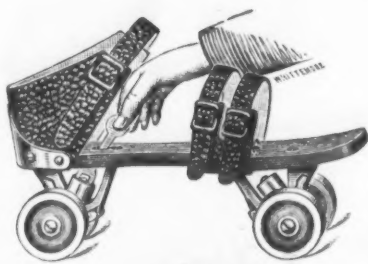
T. H. BULLOCK,**BELLOWS AND FORGE**

Manufacturer,

85 & 87 Columbus St.,

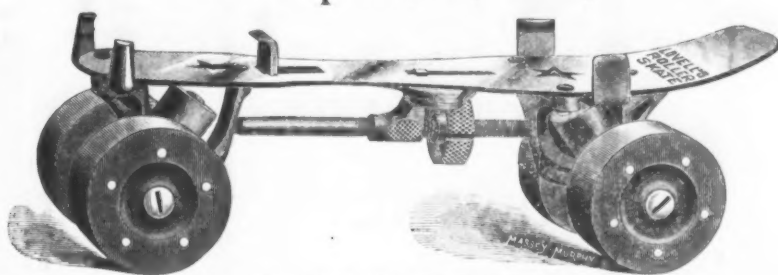
CLEVELAND,**OHIO.**

Lovell Rink Skate.



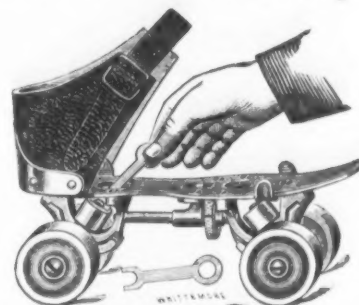
Retail Price, \$3.00.

Lovell Roller, All-Clamp.



Retail Price, \$6.00.

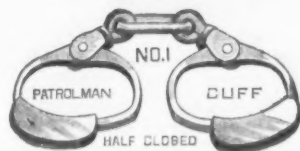
Lovell Half-Clamp Skate.



Retail Price, \$6.00.



SOLE LEATHER POLICE CLUB.



NO. 1

PATROLMAN

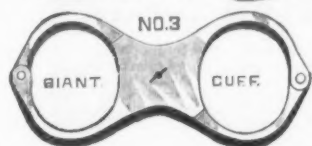
CUFF



NO. 2

PRISON

CUFF



NO. 3

GIANT

CUFF



POLICE CALL



BEAN'S PATENT POLICE EQUIPMENTS.

MANUFACTURED AND FOR SALE BY

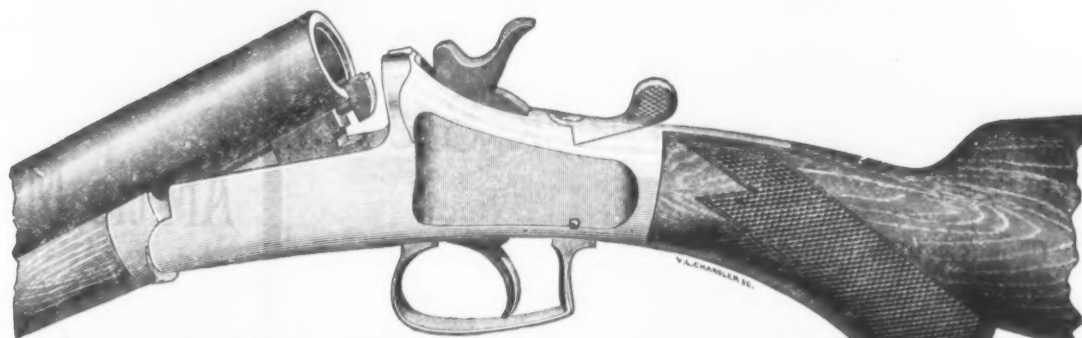
JOHN P. LOVELL'S SONS,
147 WASHINGTON STREET, BOSTON, MASS.

Send for Catalogue.

PRICES.

Club, 8 and 10 inch, \$1.50	No. 2 Cuff, Polished, \$4.00
" 12 and 14 inch, 2.00	No. 3 Cuff, Plated, with Pocket, 6.50
No. 1 Cuff, Plated, 4.75	Police Call, 1.00
No. 1 Cuff, Polished, 4.00	Police Hook, 1.25
No. 2 Cuff, Plated, 4.75	Twisters, 1.00

Mailed, post-paid, on receipt of price.



Champion Single Breech-Loading Shot-Gun.

Retail Price,
\$7.50.LOVELL'S
Double-Action, Self-Ejecting Revolver

Using 38 S. & W. C. F. Cartridges.

Champion Hammerless and Semi-Hammerless Single Breech-Loading Gun. Champion Top and Side-Snap Breech-Loading Single Gun. American Bull Dog Double-Action Revolvers, 22, 32, 38 and 44 Cal. Defender Line of Single-Action Revolvers, 22, 32 and 38 Cal. Excelsior Air Rifles, Eureka and Champion Air Pistols. Eclipse Single-Shot Pistols, 22 and 32 Cal. The Lovell Roller Skate. Police Goods of Every Description.

Prices to the Trade Sent on Application.

JOHN P. LOVELL'S SONS, BOSTON, MASS.

J. A. J. SHULTZ, President.

B. C. ALVORD, Secretary.

SHULTZ BELTING COMPANY,

COR. BISMARCK AND BARTON STS., ST. LOUIS,

MANUFACTURERS OF

Valves for Blast Furnaces.

We call attention to the Valves we make of our Patent Leather for Blast Furnaces. We guarantee them to be the best ever made, and will outwear any other. We make every size and shape, and simply say try a sample lot, and if not as represented need not be paid for. Read the testimonials from the largest concerns in the country:

OFFICE OF CAMBRIA IRON CO.,
JOHNSTOWN, PA., March 3, 1885.
J. A. J. SHULTZ, Esq., Pres't, St. Louis, Mo.
Dear Sir—In reply to your favor of January 26th, the Valves we received from your Company, in September last, were placed on the most severe parts of the engine, and are still in use. Those made of ordinary leather often last but a few days. We find your Valves to be the best we have ever used.
Yours respectfully,
D. J. MORRELL, Gen'l Manager.

REFERENCES.—Messrs. Cooper & Hewitt,
Cambria Iron Co., Sharon Iron Co., Missouri
Furnace Co.



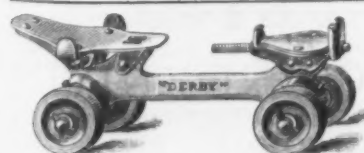
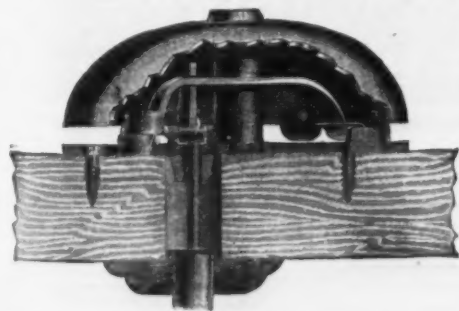
BLOOMFIELD'S PATENT

Gong & Bell.

This Gong Bell is cheap, simple and durable. There is nothing connected with it liable to get out of order, and is sure to give satisfaction wherever it is used.
Manufactured and for sale by

Flagler, Forsyth & Pierson
MFG. CO.

298 Broadway, New York.

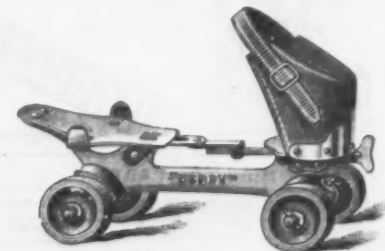
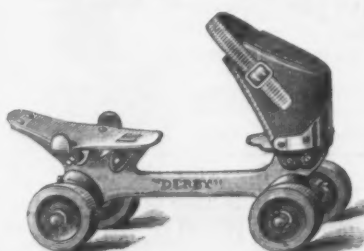
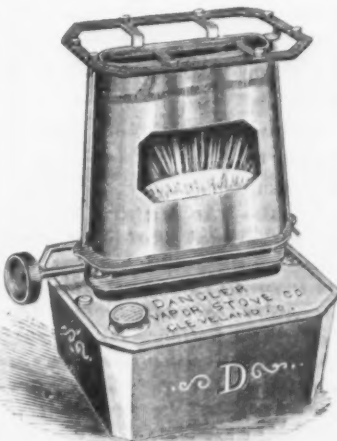


"DERBY" ROLLER SKATES.

Manufactured by SISE, GIBSON & CO.

Warehouse: 100 Chambers Street, New York.

Factory: BIRMINGHAM CONN.

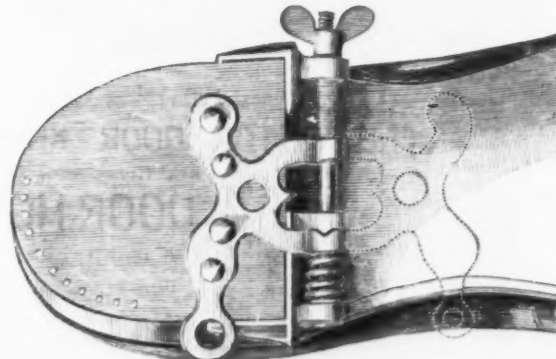
EXCELSIOR
Oil Lamp and Stove.

This wonderful combination of heat and light is a marvel of convenience and economy, furnishing a powerful and pleasant light, and a heat sufficient to cook, broil and bake. Adapted for light Housekeeping, Nursery, Camping, Milliner, Chemist, Photographer, Saloonist, &c., &c.

Weight of Lamp and Stove, 5 lbs. each.

We make the 2, 3 and 4 Burner light Oil Stoves for export. Special prices to the Trade on application. For further information, address

THE DANGLE
VAPOR STOVE and REFINING CO.,
Cleveland, Ohio, U. S. A.

SCOTT MFG. CO.,
vs.
L. A. SAYRE, } In equity.U. S. CIRCUIT COURT,
DISTRICT OF N. J.

"I am constrained to hold that upon the evidence the law the case is with the defendant. The bill is dismissed."

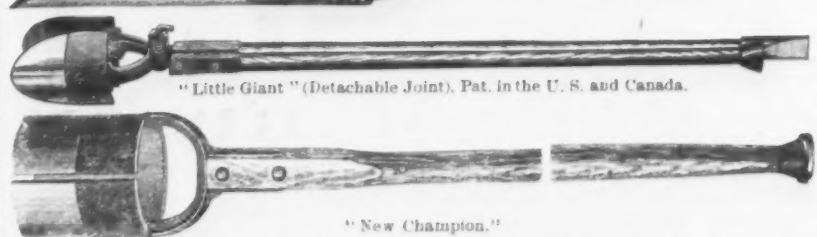
JOHN T. NIXON, J.

MANUFACTURED BY

L. A. SAYRE,

28 Orange St., Newark, N. J.
Kohler's Post Hole Diggers.

"Hercules," Pat. Oct. 6, 1885.



"Little Giant" (Detachable Joint), Pat. in the U. S. and Canada.

"New Champion."

Chieftain Hay Rake Co., Sole Manufacturers,
CANTON, OHIO, U. S. A.

Agents Wanted Everywhere for Our Portable Tree Protectors.

JAMES P. WITHEROW, Engineer & Contractor

LEWIS BLOCK,

PITTSBURGH, PENNSYLVANIA,

GENERAL AGENT FOR

WHITWELL FIRE-BRICK STOVES

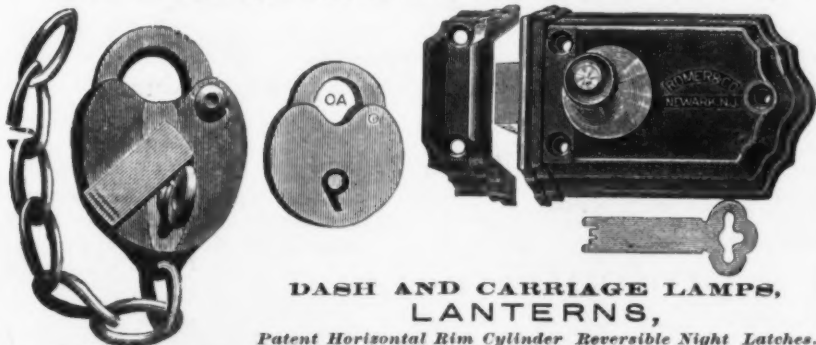
AND

Clapp-Griffiths Patents for Manufacture of Soft Steel,

SPECIALLY ADAPTED FOR A No. 1 BOILER PLATES, BOILER RIVETS, WIRE RODS
STAY BOLTS STAMPING WARE, NAIL PLATES, &c.

Will contract to completely erect, equip and place in operation Blast Furnace
Whitwell Stoves and Steel Plants as above. As I manufacture at our own works
everything appertaining to Blast Furnace and Steel Works construction, can
guarantee promptness and satisfaction.

ROMER & COMPANY, Manufacturers of PATENT
JAIL LOCKS, BRASS and IRON PADLOCKS,

DASH AND CARRIAGE LAMPS,
LANTERNS,

Patent Horizontal Rim Cylinder Reversible Night Latches.

Illustrated Lists sent to the Trade on application.

8-42 Summer Ave., near D., L. & W. R. B. Depot, Newark, N. J.

The Victor Door Knob.

PATENTED JULY 7th, 1885.

Superior to any in Strength and Durability.

Perfect Adjustment to Doors without the Use of Washers.
ADDRESS
No Screws to work out.THE VICTOR DOOR KNOB CO.,
118 Duane St., Cleveland, Ohio.

DOOR HOLDER

Coultaus' Patent.

PATENTED NOVEMBER 6, 1883.

Medal of Merit Awarded by the American
Institute, New York, 1884.

The door is held in any desired position
by the pressure of the roller on the floor,
making it a most useful article for dwell-
ing houses, offices, stores, hotels, railroad
cars, hospitals, &c., and doing away with
the hooks, chains, wedges, bricks, &c.,
ordinarily used for this purpose. The
rubber covering to the roller does no
injury to carpets or oil cloths, and by
simply lifting the handle the spring can
be thrown out of use when desired. If
the holders are required to operate
against very strong springs or winds, it
should be so stated when ordering.

Sise, Gibson & Co.,

AGENTS,

100 Chambers St., New York.

MALIN & CO., CLEVELAND, OHIO,

Dealers in Steel, Copper, Brass, Tin Plated and Copper Plated Wire.

Manufacturers of BESSEMER STEEL WASHERS.

PATENT SPOOL WIRE FOR THE RETAIL HARDWARE TRADE.

Dealers who handle it do away with the BROKEN
BUNDLE BUSINESS and sell small quantities by the
spool only. It is a convenience for both dealer
and consumer. It is SHELLAC COATED and CANNOT
BURN; is wound like spool cotton on QUARTER
POUND, HALF POUND and ONE POUND Spools, one
dozen spools in a box.
Our spooled Hair Wire is the best in the mar-
ket.

For Sale by

Hardware Jobbers Everywhere.

SEND FOR ILLUSTRATED PRICE LIST.

SPECIAL WIRES FOR MANUFACTURING PURPOSES ON ANY SIZE OF SPOOL.



C. F. RICHARDSON,
ATHOL, MASS.,

MANUFACTURER OF

IRON LEVELS.

E. L. Post & Co.

No. 10 Peck Slip,

NEW YORK.

GENERAL AGENTS

TAYLOR'S

Arctic Metal,

—FOR—

Journal Bearings, and Bab-

bitting Purposes on Iron,

Wood or Brass.

Are You Troubled with

Hot Boxes?

If so, a trial of this Metal will
convince you of its merit, as we
have yet to find an instance
where, by its use, a Hot Bearing
will not only run cool, but wear
longer than with any other Metal
manufactured.

The superiority of this metal
over all others is as follows:

1. That while hot it is the least expanded.
2. When cold the least contracted.
3. When melted it flows thinner than any other metal.
4. It makes the most perfect Bearing, either on Cold Iron or Wood.
5. It resists heat as an element of waste longer than any other Anti-friction.
6. It is the best retainer of oil.
7. It requires a high degree of heat by friction to displace it.
8. When its base is cast iron or brass its density is sufficient to stand any weight or velocity.
9. Its cost is less than the best Babbitt.
10. The finest grained metal in the market.

In addition to all the qualities named may be added the most tenacious white metal in the market, and which in re-melting will run almost as thin as water, without waste.

When once tried this metal is sure to take the place of all other anti-frictions.

N. B.—The nature of this metal is such that any dust, sand or grit which may find its way to the shaft through oil holes or otherwise does not grind between lining and shaft, but is immediately imbedded in the metal, thus preserving shaft in perfect condition.

The metal is cast in bars weighing about 5 lbs. Each package contains printed directions for use.

Price 30 Cents Per Pound.

A Sample Order, however small, will meet with prompt attention.

THE SMITH & EGGE MFG. CO.,
BRIDGEPORT, CONN.



THE GIANT PAD LOCK.

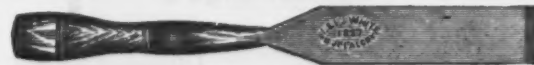
Centennial Award. "Superior in Every Respect."
This is one of the best selling locks in the market, and affords the dealer a large profit. It is thoroughly and strongly made—of the best material—very handsome in appearance, and every Lock is warranted. Orders solicited.

THE GIANT METAL SASH CHAIN

is a substitute for cord in hanging weights to windows. It is manufactured by us only, and by automatic machinery, patented and owned exclusively by ourselves, and whereby we secure uniformity of construction and quality. We have been to great expense in producing a metal having all the qualities and conditions requisite for making suitable chain for this purpose, and to prevent other chain of the same pattern of link and of the same general appearance, but made from an inferior metal, being offered as the same thing, we patented the word "Giant" as a Trade-Mark, as applied to either metal or chain. Trade-Mark Registered April 16, 1878, and October 22, 1878, and our metal is therefore known in the market as "Giant Metal," and our chain as "Giant Metal Sash Chain."

C. W. DUNLAP & CO.,
BROOKLYN, N. Y.,
Manufacturers of
A LARGE VARIETY OF
SUPERIOR
House-Keeping
HARDWARE,
SMALL MECHANICS' TOOLS
AND
DUNLAP'S IMPROVED
Garden Implements.
P. O. Box 2703, New York City

ESTABLISHED 1887.



L. & I. J. WHITE,

MANUFACTURERS OF

EDGE TOOLS & MACHINE KNIVES

Coopers', Carpenters' and Ship Tools, Cleavers, &c.

FULL LINE CHISELS.

310, 312 & 314 EXCHANGE ST.,

BUFFALO, N. Y.



FUSE, CAPS, REELS,

BATTERIES,

AUGERS,

HERCULES POWDER

WIRES,

CAP NIPPERS,

ELECTRIC FUSES.

Thawing Kettles and Stump Blasting Tools.



There is no longer any doubt but Hercules Powder is the cheapest for all mining, quarrying, and railroad work, while thousands have proved it so for stumps and boulders.

HERCULES POWDER CO., 40 Prospect St., Cleveland, O.

GEO. B. TURRELL, Pres., 75 Chambers St., New York.

DUNCAN K. MAJOR, Treas., Torrington, Conn.

UNION HARDWARE COMPANY,

TORRINGTON, CONN., U. S. A.

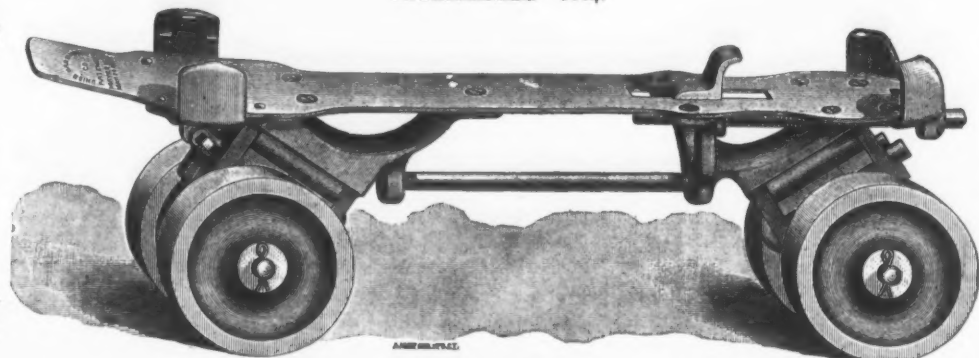
ESTABLISHED 1864.

This Cut Illustrates Our Latest Style

CLUB SKATES

For Rink and Private Use,

BOTH FOR LADIES AND GENTLEMEN.



MANUFACTURERS OF

Ice and Roller Skates, and Specialties in Hardware, Wood Turners, and Electro-platers in Gold, Silver, Nickel and Brass.
ESTIMATES FURNISHED FOR WOOD TURNING AND PLATING ON APPLICATION.

The advantage being that they will fit any style of heel, whether large or small, without the use of straps.

82. FROSTED NIQUELED

Per Pair, \$5.50.

83. POLISHED NIQUELED

Per Pair, \$6.50.

HENLEY'S MONARCH AND CHALLENGE ROLLER SKATES.

THE LATEST AND BEST!

AND MOST COMPLETE SCIENTIFIC

SKATES

IN THE MARKET.

PATENTED.

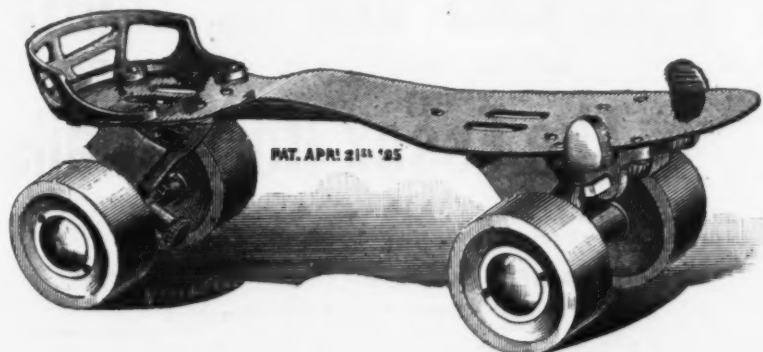
Send 4c.-Stamp for New Illustrated 68-page Catalogue.

M. C. HENLEY,
Patentee and Manuf'r.

FACTORY AND OFFICE:

Nos. 523 to 533 N. 16th St.,
RICHMOND, IND.MENTION *The Iron Age*.

The Henley Rink Skate.

THE
Henley Spring Steel
Club Skate.

The J. E. Evans Anti-Friction Skate.

PERFECTED ON THE BALL-BEARING PRINCIPLE.

In General Use by Experts and Fancy Skaters, who pronounce it the Best, Easiest Running and Cleanest Skate made. It is perfect in Adjustability, to suit beginner or expert, and is *Self-Lubricating*.

EVANS SKATE CO., MFRS., 175 W. 4TH ST., CINCINNATI, OHIO.

DISCOUNT TO RINKS AND THE TRADE.

Agents for the Leatheroid Roller, the easiest running, the finest finished and most durable Skate Roll ever made.

PIG IRON,

BAR IRON,

BAR STEEL,

STEEL BLOOMS,

STEEL BILLETS.

RIVERSIDE IRON WORKS,

MANUFACTURERS OF

RIVERSIDE STEEL NAILS,

WHEELING, WEST VIRGINIA.

SMALL T RAILS,

FLAT RAILS

OF IRON OR STEEL

FISH BARS

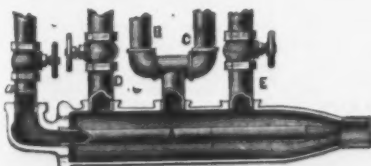
OF IRON OR STEEL.

IVES' PAT. SASH LOCKS & DOOR BOLTS.

For Sale by all Dealers in
HARDWARE

MANUFACTURED BY

Hobart B. Ives & Co., New Haven, Conn., U. S. A.



McDANIEL'S SUCTION FITTING,

Pat. Jan. 27, 1884.

Will stop all snapping and cracking noises in steam pipes; increases heat in dry rooms. The only fitting in the world that will do it. It is worked by steam after passing through the heaters.

McDANIEL'S PATENT EXHAUST-PIPE HEAD acts as a muffler, preventing noise of exhaust steam, and stops all spattering of water on roofs and pavements.

CHAPMAN'S
Improved Steam Trap.

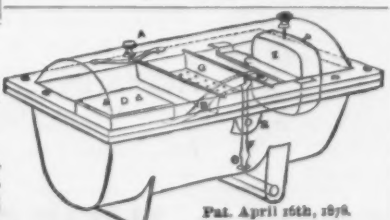
For Heating Apparatus, Dry Rooms, Breweries, Factories, Distilleries, Sugar Houses, Pipes leading to Steam Pumps in Mines, Canning Houses, &c.

All the above sent on trial and satisfaction guaranteed. Sold by the trade generally.

WATSON & McDANIEL, 248 N. 8th Street, PHILADELPHIA.

WATSON'S STEAM PRESSURE
REGULATOR.

For reducing and giving an even pressure, regardless of pressure on boilers. For Paper Mills, Heating Apparatus, Sugar Refineries, &c. &c.



Pat. April 16th, 1878.

PHIPPS

& BURMAN'S

Patented Reversible, Self
Sharpening, and other
Improved

CLIPPERS

For Horsemen and Barbers.

Please observe that every

FIRST QUALITY CLIPPER

1. Is NICKEL PLATED.

2. Has BLACK HANDLES.

3. Has a LEATHER POCKET.

4. Is packed in a BOX bearing

OUR LABELS.

5. Is accompanied by a CER-

TIFICATE of genuineness.

6. Is NUMBERED to correspond

with certificate.

7. Is examined and TESTED.

Beware of imitations and in-

fringements. Write for new

illustrated catalogue and re-

duced prices, to

JESSE LEE & SON,

SOLE AGENTS.

37 S. Fourth Street,

Philadelphia.

Established
1855.

KEYSTONE WORKS.

Centennial Award
1876.

GEORGE GRIFFITHS

MANUFACTURER OF



PATENT SOLID CAST STEEL

Shovels, Spades and Scoops.

Also COAL HODS, &c.,

Nos. 511, 513 and 515 Locust St.,

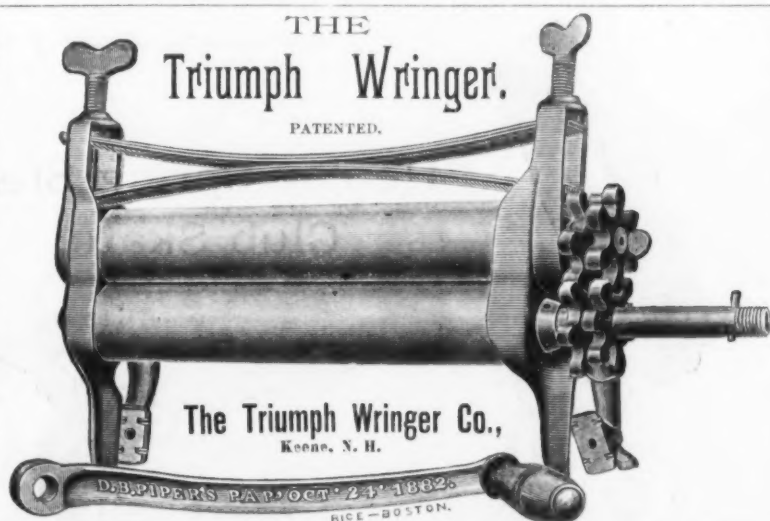
Send for Price List.

PHILADELPHIA, PA., U. S. A.



A collection of ten vintage hand tools, including various knives and a saw, arranged vertically. Each tool has a metal head and a wooden handle. The blades of the knives are engraved with the text "W.D. & H.O. WILKINS" and "LONDON". The tools include a large folding knife at the top, followed by several smaller folding knives and a saw. The handles are made of dark wood with visible grain and some wear. The blades are made of metal and show signs of age and use.

The Best Thumb Screw Wringer Ever Made.



PRICES:
Full and half Clamp, polished and nicked. . . . \$6.00
Full and half Clamp, blued 5.00
Strap or Kink Skates, with wood foot-boards. 3.50

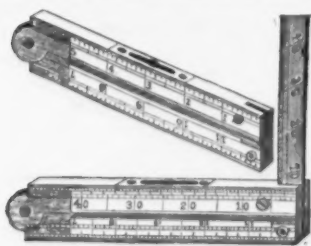
The usual discounts allowed to rinks and wholesale dealers.

Manufactured by
Hopkins Watch Tool Co., Waltham, Mass. | **THE ALFORD & BERKELE CO.,**
P. O. Box 2002, 77 Chambers St., New York.



Only 10 Cents a Yard.

COURTENAY & TRULL, Proprietors, 15 Dey Street, NEW YORK.



Also, Exclusive Manufacturers of
L. C. STEPHENS' PATENT COMBINATION RULE.

A detailed black and white illustration of a brick structure, likely a furnace or boiler, featuring a grate. The grate is labeled "AETNA GRATE PAT 1872". Below the grate, a saw blade is shown with the text "AETNA GRATE PAT 1872" inscribed on it. The entire illustration is framed by a decorative border.

Aetna Grate Bar Comp'y,
110 Liberty St., New York.

This Creeper is made of the best English Crucible Cast Steel Wire, hardened and tempered. It can be put on the heel in an instant, and can be taken off as easily. To put it on the inside of the Creeper on the heel, then spring open till the other side will go on the heel. To take it off, take hold of the back and pull down till it comes off.

Wm. McNeely, Pat. & Mfr., 515 Cherry St., Phila.
West'n Agents, Hibbard, Spencer, Bartlett & Co., Chicago.

Largest Iron Fence and Railing Works in U. S.



ALFRED F. BRAINERD,
ANALYTICAL CHEMIST AND
MINING ENGINEER,
Birmingham, . . . Alabama.



MADE IN U.S.A.

SEND FOR CIRCULAR.

Made of the very best materials; simple in construction; light and neat in appearance; noiseless in movement; easy to keep in order; finished in thorough and workmanlike manner; warranted to possess all the qualities and requirements necessary for any and all purposes where ROLLER SKATES ARE USED.

Rubber Cushion held in Patent Adjustable Box; can be raised or lowered at pleasure to take up all wear.

237 WASHINGTON ST., BOSTON, MASS., AND 96 CHAMBERS ST., NEW YORK.



The Essex Horse Nails

HALIFAX PATTERN

GERMAN ACME CLUB SKATES

No. 5.	No. 7.	No. 8.	No. 10.
Polished Blade.	Nickel Plated.	Nickel Plated.	Nickel Plated.

ROBERT M. DIAZ & CO., Boston, Mass.,
IMPORTERS AND DEALERS IN
CUTLERY, FANCY HARDWARE AND SKATES.

The HUGUNIN IMPROVED ADJUSTABLE SASH BALANCES.

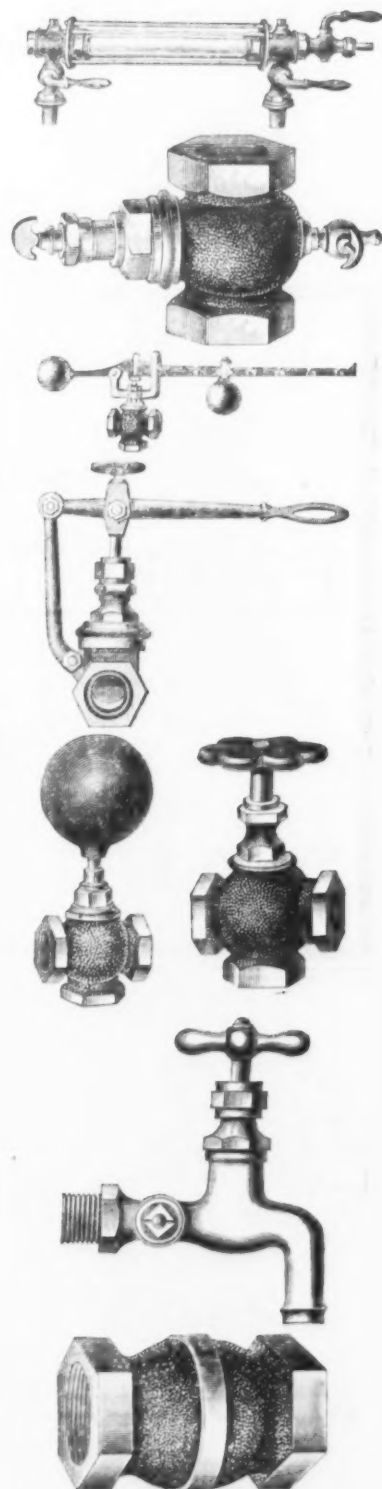
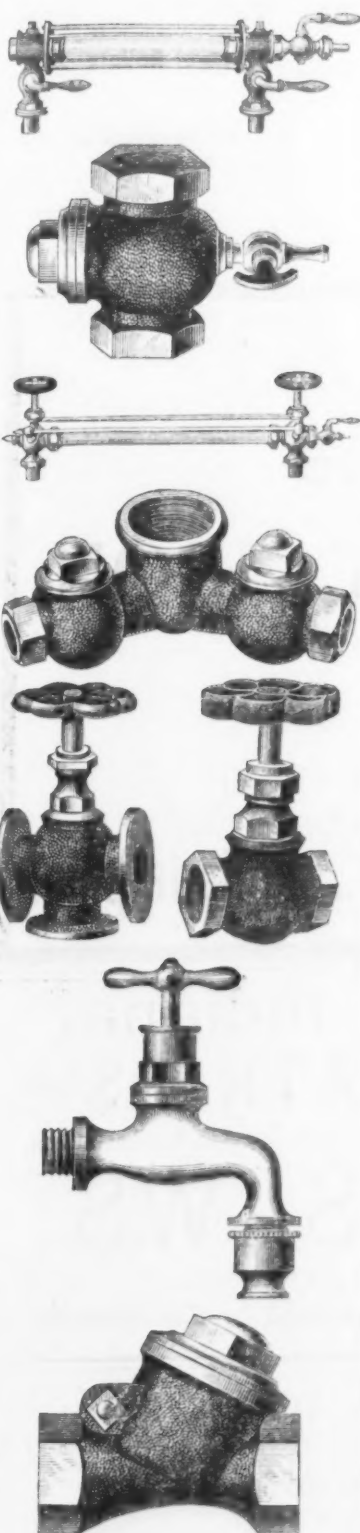
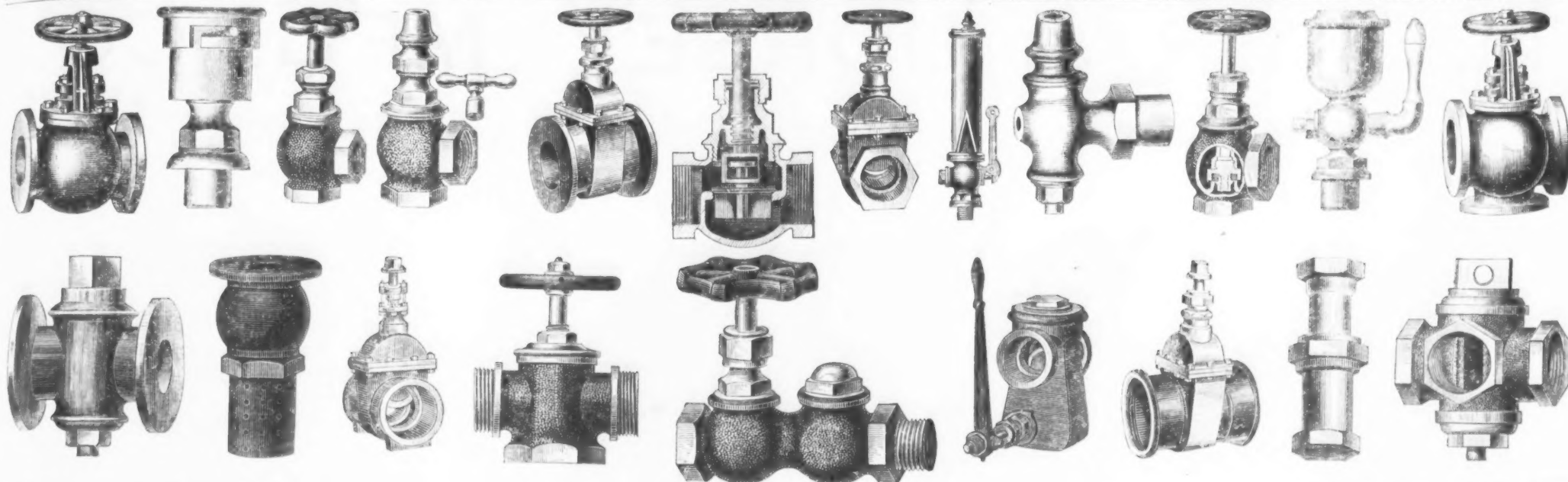
3 sizes: No. 1, 1 1/4 in. wide; 30 lb. Sash and under; retail price, \$1.25 per set & Gray Iron.
No. 2, 1 3/4 in. wide; 40 lb. Sash and under; retail price, \$1.50 per set & Gray Iron.
No. 3, 2 in. wide; 50 lb. Sash and under; retail price, \$1.75 per set & Gray Iron.

Malleable No. 1, No. 1; No. 2, \$1.50 cents, per set & 4. The Improved goods have been made and sold the past four years, with satisfaction to the dealer and user, proven by increasing orders from the trade, and hundreds of endorsements from users, including builders and architects. The principle and mechanism of these goods meet the approval of those who can judge of the merits of the goods, and the value of the goods. The Improved drawing the adjusting screw—without removing the balances or sash. There are no boxings or attachments to the sash, leaving the latter free for removal for cleaning, and all rattling of the sash is prevented. The balances will give permanent satisfaction if applied according to the simple, illustrated directions. The Improved goods are made by the **SOLE MANUFACTURER** and **Solely Authorized Maker** cast directly on the face of the goods. Reject all others as fraudulent imitations, and save trouble and expense. The old unimproved style has been fraudulently copied, using the name of one of my agents, and sold at a low price, to the great injury of the buyer. I have constant letters of complaint, and advise all who have been swindled to keep their evidence till settlement day comes round. No clock works, no time, durable, elegant, and safe. Sample sent by mail on receipt of price above only. No regular agent in New York. Goods delivered in New York free. Address orders, &c.,

ROBT. B. HUGUNIN, Hartford, Conn.

Cans, Tinware, Silver and Brass Goods, Locks, Hardware
and other Iron Goods. A new line of Purchasing Brokers just sent

STRAP HINGES, 70 and 5 per cent
MANUFACTURERS OF
6, 8, 10 HEAVY STRAP.
JAMES MANN & SONS, - Buffalo, N. Y.



THE
UNITED BRASS COMPANY,

MANUFACTURERS OF EVERY VARIETY OF

Brass and Iron Valves and Cocks

FOR

STEAM, WATER, GAS, OIL AND CHEMICALS.

Steam Fitters', Machinists' and Boiler Makers', Engine,
Pump and Ship Builders'

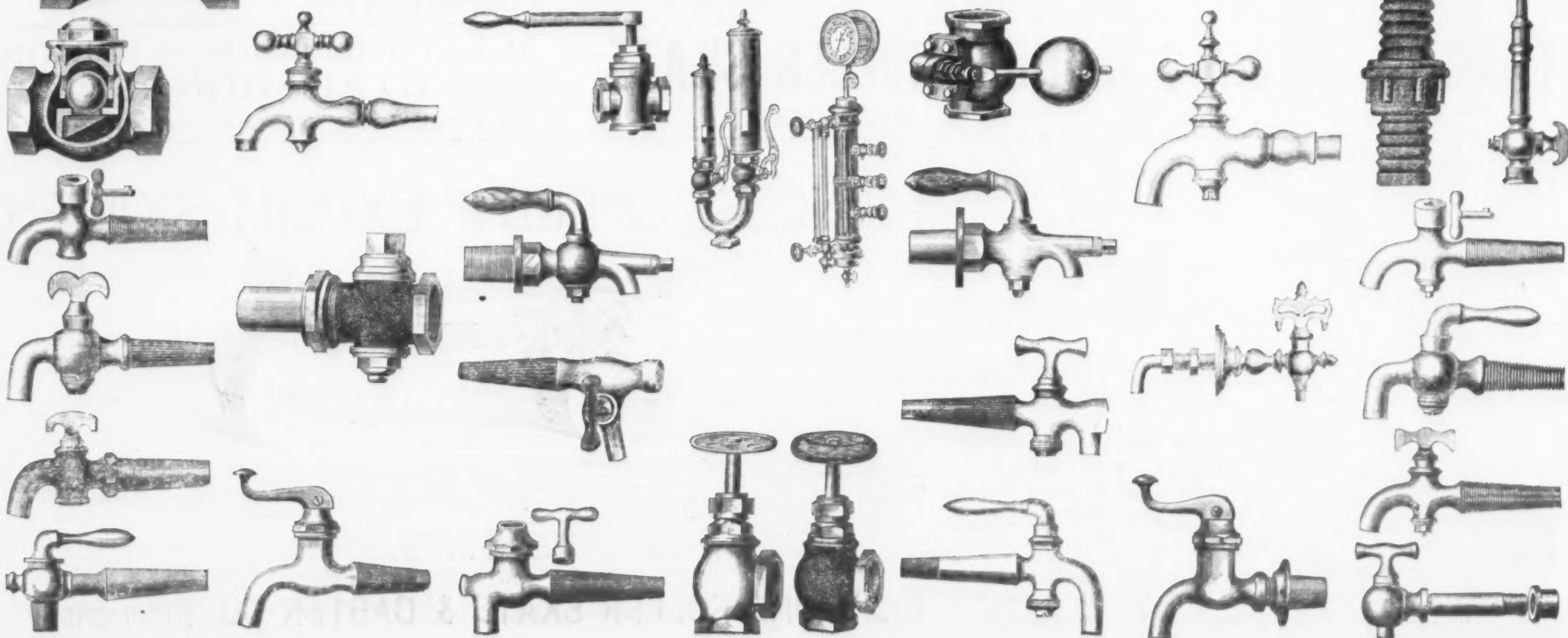
SUPPLIES AND TOOLS.

OFFICE AND WAREROOMS:

79 FULTON AND 54 GOLD STREETS, NEW YORK.

WORKS: LORAIN, OHIO.
HAYDENVILLE, MASS.

Our New Steam Catalogue and Price List is now
ready and will be sent to the Trade with first order
or by express if desired.



TUCKER & DORSEY MFG. CO.,

INDIANAPOLIS, INDIANA.



KRAUT CUTTERS.

No 1	.....	1 knife, with box, 8 x 26, per dozen.
" 2	.....	2 knives, " " "
" 3	.....	3 " " "
" 4	.....	4 " " "
" 5	.....	3 " " 9 x 30, "
" 6	.....	2 " " 12 x 36 each.
" 7	.....	3 " " "
" 8	.....	4 " " "
" 9	.....	3 " " 12 x 40, "
" 10	.....	4 " " "



MANUFACTURERS OF

Tucker's Alarm Tills, Steak Mauls,
"Daisy" Stove Trucks, Rolling Pins,
Hoosier Saw Bucks,
Kraut, Slaw and Vegetable Cutters,
Bench Stops, Towel Rollers,
Potato Mashers, &c.

ASK YOUR JOBBER FOR

ALAN WOOD & CO.'S PATENT LEVEL GALVANIZED SHEET IRON,

And Have No Other.

Absolutely **FLAT** and **FREE FROM ALL BUCKLES.**

EVERY BUNDLE
BRANDED

PATENT LEVEL.

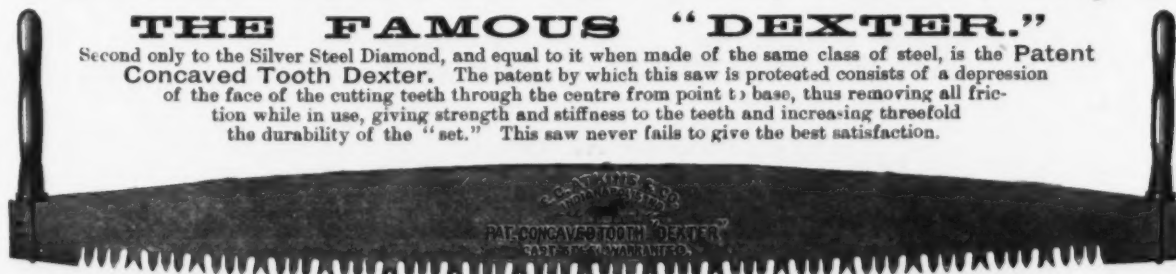
ALAN WOOD & CO., Philadelphia.



E. C. Atkins & Co., Indianapolis, Indiana.

THE FAMOUS "DEXTER."

Second only to the Silver Steel Diamond, and equal to it when made of the same class of steel, is the Patent Concave Tooth Dexter. The patent by which this saw is protected consists of a depression of the face of the cutting teeth through the centre from point to base, thus removing all friction while in use, giving strength and stiffness to the teeth and increasing threefold the durability of the "set." This saw never fails to give the best satisfaction.



Ground substantially uniform gauge on the toothed edge, and any gauge required on the back.

ATKINS'

Cross-Cut, Circular, Band and Gang

SAWS

Are Everywhere Recognized as the
Standard of Excellence.

MECKLENBURG IRON WORKS, CHARLOTTE, N. C., JOHN WILKES, MANAGER.

MANUFACTURERS OF

Stamp Mills and Pumps for Gold Mines, and Mining Machinery of every description; Steam Engines, Portable and Stationary Boilers and Saw Mills, with Reamy's Patent Feed and Backing Device. Also Manufacturers of the Celebrated Centennial Cotton Press.

THAD. A. NEELY'S MUNCIE ROLLER SKATE.

MUNCIE, - - - INDIANA.

ACKNOWLEDGED SUPERIOR
TO ALL OTHERS.

SEE ILLUSTRATION IN NEXT ISSUE.

Hub Malleable Iron Axe Wedges.



PATENTED NOVEMBER 21, 1882.

It Can be Taken Out Easily.

The screw holds the wedge in place. Take out the screw and the wedge can be easily removed, allowing the handle to be withdrawn from the axe. Try them and you will buy no other. Send for sample.

MANUFACTURED ONLY BY

HENRY BROOKS & CO.

115 Milk Street, Boston, Mass.

"COMMON SENSE" MOUSE TRAP.
BEST IN MARKET.

For Home & Export Trade.

RIPLY MFG. CO.,

Unionville, Ct., U. S. A.,

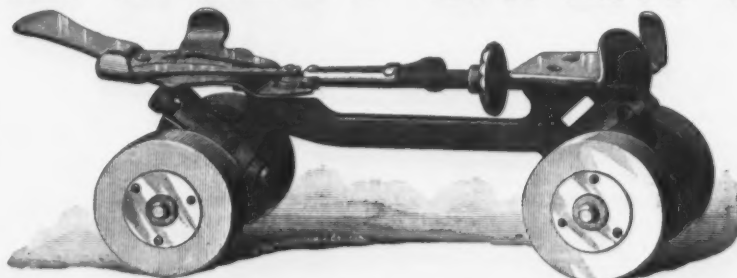
Manufacturers of

Porcelain-Lined Lemon Squeezers, Mallets, Rose-Wood Faucets, Patent Boot Jacks and Hardware. Fine Wood Turning a Specialty.



PRINCESS SPEED AND EXPERT SKATES.

PATENTED June 30, 1885.



PATENTED June 30, 1885.

The above cut illustrates the only practical and thoroughly reliable speed and expert skate made. It is provided with the only safe and scientifically constructed anti-friction wheel in existence. In proof of our sincerity in making this broad claim we warrant every part and piece to last six months' active and hard use, except anti-friction wheel rims, which can be replaced at cost of one set of boxwood wheels, and will replace all worn or broken parts free of cost to the owner. No other manufacturers dare place so strong a guarantee upon their skates. Price, per pair (including, if desired, fancy overlapping heel and instep straps), cash, \$7.00. Sizes 5 to 9, or 9 1/2 to 11 1/2 inches. The whole \$7.00 refunded if they are not as represented. Speed, Expert and Polo Skaters will find it to their advantage to accept our liberal offer. Our line is the finest in the United States, consisting of Plain Rink, Club Rink, Half-Clamp Clubs, Full Nickel-Plate, with or without Truss-rod, Full Clamp Lever Clubs and Sidewalk Skates. Exclusive agency given to reliable dealers.

SEND FOR ILLUSTRATED CATALOGUE AND TERMS TO THE TRADE. ADDRESS

RICHMOND ROLLER SKATE & CASTER CO., RICHMOND, IND.

ROOT'S HANDY CLOTH BOUND HARDWARE PRICE CARDS, FOR EITHER WHOLESALE OR RETAIL TRADE.

COPYRIGHTED 1885.

(CARD
No. 11-A.)

THESE CARDS COVER the lines having a large variety of sizes or numbers, avoid marking each package or article, in Retail Stores, and are very convenient for use in Wholesale Sample Rooms. They secure correct and uniform selling prices, pay for themselves several times a year by saving time, and are intended for at least ten years' constant use. Hence, no Hardware Dealer can afford to do without them, or spend the time required to write and rule out something similar by hand. They are printed in very distinct type, on the best *Byron Weston's Ledger Paper*, appropriately ruled with blue ink cross-lines and red ink down rulings,

DESCRIPTIONS AND PRICES.

Card No.	Size and Price Per Card.
1	A—BAR IRON, Weight of Round, Square and Flat, per Foot, and Tire per set. Western Classification and Prices of Extras on American, Norway and Swedes. 5½ x 18 in. 40c.
2	B—BAR STEEL, all Kinds and Sizes with Prices of Extras. Horse and Mule Shoes, Size, Weight, No. in Keg. Toe Calks. Cut Nails, List of Extras. 3 x 13½ in. 30c.
3	A—CUT TACKS, Exact size cuts. Length. Number in a pound. B—LARGE HEAD CARPET TACKS. Gimp and Lace Tacks. Hungarian Nails, Hob Nails, Blued and Tinned, American and Swedes. Exact size cuts shown of all the above. 3 x 13½ in. 30c.
4	A—SHOE NAILS. Cigar Box Nails. Copper Tacks, Double-Pointed Tacks and Cuts. Glaziers' Points and Cuts. Barbed Blind Staples. 3 x 13½ in. 30c.
5	B—PATENT BRADS. Finishing Nails. Blued Clout Nails. Tinned Clout Nails. 3 x 13½ in. 30c.
6	A—IRON WOOD SCREWS. B—IRON WOOD SCREWS (continued). Iron Machine Screws. 6 x 16 in. 40c.
7	A—STANDARD CARRIAGE BOLTS. B—STANDARD CARRIAGE BOLTS (continued). Plow Bolts. 3 x 13½ in. 30c.
8	A—MACHINE BOLTS. B—STANDARD TIRE BOLTS. Round and Flat Head Stove Bolts. 3 x 13½ in. 30c.
9	A—PHILADELPHIA CARRIAGE BOLTS. B—PHILADELPHIA CARRIAGE AND TIRE BOLTS. 3 x 13½ in. 30c.
10	A—SQUARE AND HEXAGON NUTS. Wrought Washers. Size of Bolt, size of Hole, Width, Thickness, number in 100 pounds. B—COACH OR LAG SCREWS. Superior and Norway Axle Clips. 3 x 13½ in. 30c.
11	A—BRIGHT SCREW HOOKS. Belt Hooks. Blake's Belt Studs. B—BRIGHT SCREW EYES. Gate Hooks and Eyes. Cornice Hooks and Eyes. 3 x 13½ in. 30c.
12	A—PLATE CASTERS AND BED CASTERS. B—WROUGHT HOOKS AND STAPLES. Trap Door Rings. Hasps and Staples, and Staples only. 3 x 13½ in. 30c.
13	A—SAWS, Hand, Panel and Rip. Combination and Back. Disston's and W. M. & C.'s corresponding numbers and "Our Brand." B—SAWS, Back, Compass, Pruning, Kitchen, Butcher's Bow and Blades, Framed Wood Saws and Blades. 3 x 13½ in. 30c.
14	A—CHISELS. Slicks, Socket Framing, Socket and Tanged Firmer, Corner. B—Turning Chisels and Gouges, Socket and Tanged Firmer Gouges. 3 x 13½ in. 30c.
15	A—Cast Steel Augers and Bits. Boring Machine Augers. Jennings' Auger Bits. B—Bit Stock Drills. Gimlet Bits, German Pattern, Double Cut and Countersink. Center Bits. Clark's Expansive Bits. 3 x 13½ in. 30c.
16	A—HAMMERS. Adz Eye, Bell Face, Joiners', Steel Face and Claw, Riveting, Farriers', Blacksmiths', Machinists', Engineers'. B—HAMMERS. Tack, Masons', Sledges, Miscellaneous. HATCHETS. Shingling, Lath, Half, Claw, Broad or Bench, Hunters'. 3 x 13½ in. 30c.
17	A—FILES. Bastard, Mill, Flat, Hand, Half-Round, Round, Square, Knife, Warding. Second Cut, Mill, Flat, Hand, Half-Round. Smooth, Flat and Hand. B—FILES. Smooth, Half-Round, Round, Cabinet, Pit Saw, Hook Tooth, Gin Saw, Band Saw, Cant, Taper, Stubb's Taper. Rasps, Cabinet, Wood, Shoe, Horse. 7 x 15 in. 50c.
18	A—Rubber and Hemp Packing. Gaskets or Rings. Rubber Hose. B—Leather and Rubber Belting. 3 x 13½ in. 30c.

SAWS.

DISSTON'S NO. 3.		PANEL, HAND & RIP.		W. M. & C. NO. 12.	
Length In.	List.	Cost.	Job.	Sell.	
16					
18					
20					
22					
26					
28					

DISSTON'S NO. 7.		PANEL, HAND & RIP.		W. M. & C. NO. 25.	
Length In.	List.	Cost.	Job.	Sell.	
16					
18					
20					
22					
26					
28					
30					

DISSTON'S NO. 8.		HAND AND RIP.		W. M. & C. NO. 26.	
Length In.	List.	Cost.	Job.	Sell.	
26					
28					

DISSTON'S NO. 8.		HAND AND RIP.		W. M. & C. NO. 27.	
Length In.	List.	Cost.	Job.	Sell.	
26					
28					
30					

DISSTON'S NO. 12.		HAND AND RIP.		W. M. & C. NO. 27.	
Length In.	List.	Cost.	Job.	Sell.	
26					
28					

OUR BRAND.					
PANEL, HAND AND RIP.					
Length In.	List.	Cost.	Job.	Sell.	
16					
18					
20					
22					
26					
28					

SPECIAL C. S. PANEL AND HAND.					
Length In.	List.	Cost.	Job.	Sell.	
16					
18					
20					
26					

COMBINATION HAND.					
Length In.	List.	Cost.	Job.	Sell.	
26					

DISSTON'S NO. 1.		BACK.		W. M. & C. NO. 5.	
Length In.	List.	Cost.	Job.	Sell.	
10					
12					
14					
16					

for noting in pencil—List, Cost, Jobbing and Selling Prices—as in sample of Card 11-A, shown in the center of this page. Cards A and B of each number are mounted on each side of a tough, heavy card-board, especially adapted for this use, which is further protected on the four edges by being *cloth bound*. Two-thirds of them are 3 x 13½ inches. This size has been found convenient for hanging on a pilaster finish, or any other narrow surface, without hiding the goods. To hang or chain up each card there is firmly inserted through the top and center a nickel-plated eyelet about ⅜ inch inside diameter. They will be sent, *charges prepaid*, on receipt of price.

DESCRIPTIONS AND PRICES.

Card No.	Size and Price Per Card.
17	A—WINDOW GLASS. List Prices and No. Lights per Box. Also ruled columns for other Wholesale and Retail rates. B—SASH, DOORS AND BLINDS. List Prices. 6 x 18½ in. 40c.
18	A—HINGES, Strap, Light and Heavy. T. Light, Heavy and Extra Heavy. Hinge Hasps, Screw Hook and Strap. B—SCREW HOOK AND EYE HINGES. Barn Door Hangers, Checked Back, Kidder's, Anti-Friction, Wrought Frame. Barn Door Stay Rollers, Rail, Pulls, Latches. Sliding Door Rail. 3 x 13½ in. 30c.
19	A—WROUGHT BUTTS, Narrow, Loose Pin, Light Inside Blind. B—LOOSE PIN BUTTS, Plain, Japanned and Plated Tips. 3 x 13½ in. 30c.
20	A—LOOSE JOINT BUTTS, Plain, Japanned and Plated Tips. B—TABLE HINGES, Bronzed Iron Blind Butts. Brass Butts, Narrow, Middle, Broad and Desk. Width when open given of all. 3 x 13½ in. 30c.
21	A—DOOR BOLTS, Barrel, Square Spring, Foot, Chain. B—DOOR BOLTS, Flush, Neck and Miscellaneous kinds. 3 x 13½ in. 30c.
22	A—SCREW DRIVERS, Flat and Round Blade, Ratchet, Clark's. Screw Driver Bits. Countersinks, Reamers, Belt or Saddlers' Punches. B—RULES. WRENCHES. 3 x 13½ in. 30c.
23	A—HOOKS, Coat and Hat, Wardrobe, Schoolhouse, Harness, Clothes line. B—SHELF BRACKETS. DRAWER PULLS. 3 x 13½ in. 30c.
24	A—WOOD PLANES, Plane Irons, Cut and Double. B—PATENT PLANES. Patent Plane Irons. 3 x 13½ in. 30c.
25	A—WOODENWARE AND BASKETS. Alphabetically arranged. B—WOODENWARE (continued). Alphabetically arranged. 7 x 22 in. 70c.
26	A—PIECED TINWARE. Alphabetically arranged. B—STAMPED TINWARE. Alphabetically arranged. 7 x 22 in. 70c.
27	A—JAPANNED TINWARE. Alphabetically arranged. B—GRANITE OR AGATE IRONWARE. Planished Ware, Stove and Hollow Ware. All Alphabetically arranged. 7 x 22 in. 70c.
28	A—MORTISE DOOR LOCKS, Latches, Knobs and Escutcheons. B—RIM DOOR LOCKS, Latches, &c. 7 x 22 in. 70c.
29	A—PADLOCKS, Japanned, Wrought Iron, Bronzed Iron, Brass and Jail. B—COMPLETE COMPARATIVE LIST OF CORRESPONDING NUMBERS OF PADLOCKS, Mallory, Wheeler Co., Wm. Wilcox Mfg. Co., Russell & Erwin Mfg. Co., Norwich Lock Mfg. Co., Nimick & Brittan Mfg. Co. Revised to July, 1885. 6½ x 22½ in. 70c.
30	A—CABINET LOCKS, Drawer, Chest, Cupboard and Trunk. Cabinet Keys. B—COMPLETE COMPARATIVE LIST OF CORRESPONDING NUMBERS OF CABINET LOCKS, Eagle, Corbin, Parker, Gaylord. Revised to July, 1885. 7 x 24 in. 70c.
31	A—Length and number of Nails to the pound. Number of feet in a bundle of Hoop, Scroll and Band Iron. Number of feet of Wire in a pound. Coil or Cable Chain, weight per 100 feet and proof in tons. Bright Coil and Halter Chain and corresponding No. of wire. Sash weights and lines required for common sized windows. B—MISCELLANEOUS TABLES. Showing number Copper Rivets and Burs in a pound. Size of Skates compared with Shoes. Scale Beams, poise or weight needed for each. Brass Kettles, size, weight and capacity. Strap and T Hinges, weight and number packed in a barrel. Comparative Nos. of leading makers of Rules and Levels. Revised to July, 1885. Manila Rope, feet in a pound, weight of coils, breaking strain, &c. 6 x 22 in. 70c.
32	Is adapted for filling in with any line of goods. It is ruled both sides with columns headed respectively "Description," "Size or No.," "List," "Cost," "Job," "Sell." 4 x 14 in. 20c.

LESS THAN A SET PRICED AT THE ABOVE RATES.

PRICES IN SETS.

Set No. 1. Includes all the numbers, 1 to 32 inclusive. Price, \$10.00 per set.
Set No. 2. Omits Cards Nos. 25, 26, 27, and includes all the other numbers described above. " 8.00 "

Set No. 3. For Dealers in Tinware and House Furnishing Goods, consists of Cards Nos. 25, 26, 27. Price, \$2.00 per set.
Set No. 4. Includes the following *Eighteen Leading Cards* for Retail Trade: Nos. 2, 3, 9, 10, 11, 12, 13, 14, 15, 18, 19, 20, 22, 23, 24, 28, 31, 32. " 5.00 "

SENT PREPAID ON RECEIPT OF PRICE BY

DAVID WILLIAMS, Publisher and Bookseller, 83 Reade Street, New York.

Write for estimates, and mention this paper.



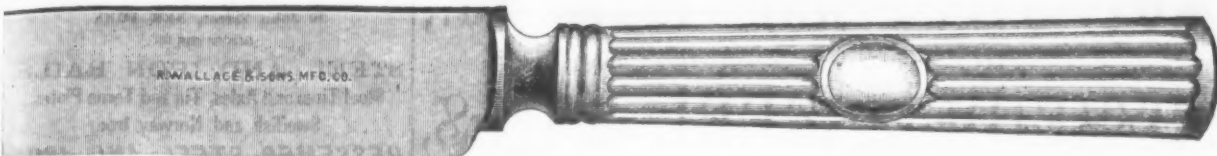
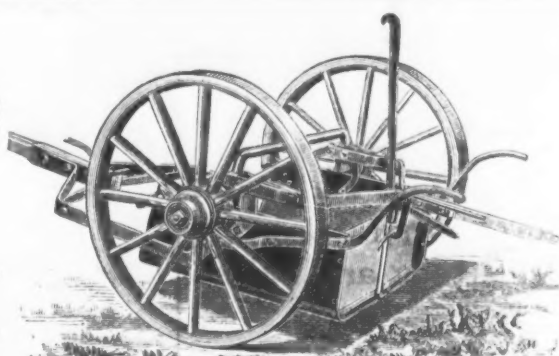
HASLUP'S PATENT WHEEL SCRAPER

Has great advantages over all others. It has more capacity, is easier handled by man and team, and the only Wheel Scraper made that does not make the horses' necks sore. It has all the latest improvements and exceeds any thing of the kind ever offered to the trade. Good on long and short hauls. Three sizes, 9, 15 and 16 cubic feet.

HASLUP'S ALL STEEL DRAG SCRAPER

Beats all others for capacity, durability, strength and light draft. Being ALL STEEL (except wood handles), are lighter, stronger and better made than any other. Three sizes. Also Township and Railroad Plows.

SIDNEY STEEL SCRAPER CO.,
SIDNEY, OHIO, U. S. A.



The above cut represents one design of our new Hollow Handle Knife, either silver or nickel silver handles, made of a seamless drawn tube. This handle is not soldered, as is the usual method, and yet has the taper and form necessary to produce the most durable and tasteful article of its kind ever shown. Knives can be furnished either plain or ornamented handles.

R. WALLACE & SONS MANUFACTURING COMPANY,

MANUFACTURERS OF SOLID SILVER WARE GUARANTEED 999 FINE, ALSO NICKEL SILVER HOTEL AND TABLE WARE,

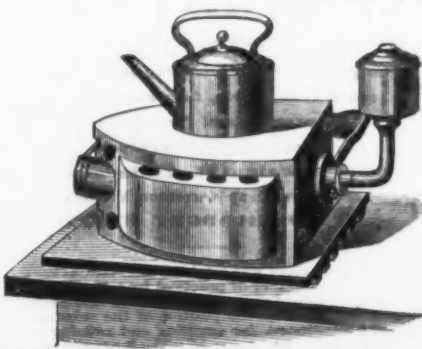
Factories, WALLINGFORD, CONN.

New York House, 21 PARK PLACE.

FOX SAD-IRON CO.,

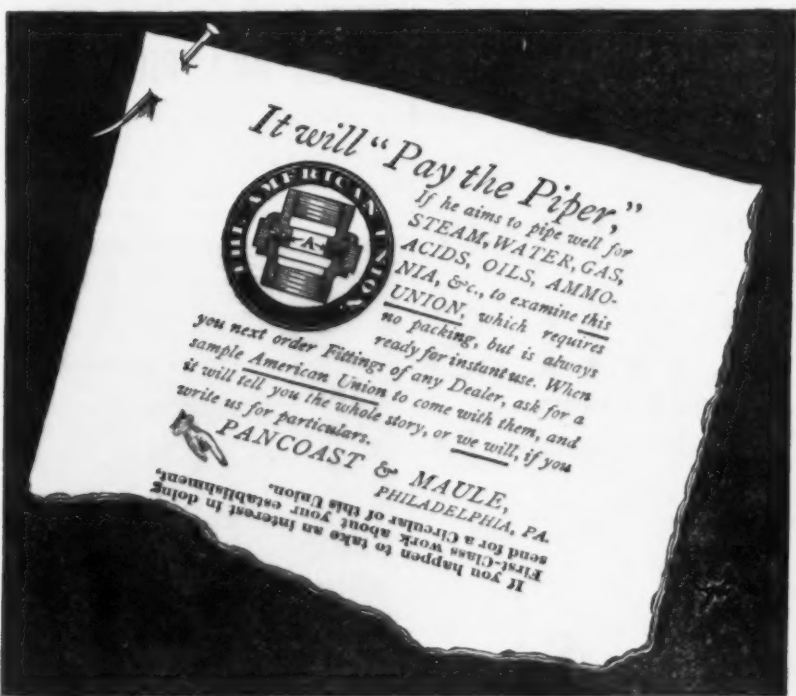
78 MAIDEN LANE,
NEW YORK.

Awarded the only Gold Medal at the New Orleans Exposition over all Sad-Iron competitors.



Our Iron does away with Hot Kitchens.

Being reversible, one Iron does the work of an entire set (one side heats while the other is in use). It combines first-class Fluter and Polisher, also makes the best little Cooking Stove for a sick-room, &c., ever invented. Can be used with either Gas or Alcohol. Very simple and absolutely safe in handling.



It will "Pay the Piper,"

If he aims to pipe well for STEAM, WATER, GAS, ACIDS, OILS, AMMONIA, &c., to examine this UNION, which requires no packing, but is always ready for instant use. When you next order fittings of any Dealer, ask for a sample American Union to come with them, and it will tell you the whole story, or we will, if you write us for particulars.

PANCOAST & MAULE,
PHILADELPHIA, PA.

FROST'S PATENT THILL SPRING.

(ANTI-RATTLE.)



Over two millions now in use, giving perfect satisfaction. Does not show when in the carriage.

The above cut shows the Wear of a Spring that has been in constant use for over one year.

Every pair warranted for one year, and NO RATTLE. I take all the risk, you take none. Send for Circular and Price List to

STILES FROST, Sole Manufacturer,
276 Devonshire Street, BOSTON, MASS.

MERIDEN MALLEABLE IRON CO.,
MERIDEN, CONN.,

Manufacturers of a Full Line of the Latest Improved Patent Adjustable Iron Planes.

THE BEST NOW IN THE MARKET.

Send for Full Descriptive Catalogue.

New York Office, 37 Barclay St. Boston Office, 147 Franklin St.



BUFFALO SCALE CO., BUFFALO, N. Y.,

Manufacturers of
R. R. Track Scales, Hay Scales, Coal Scales, Grain Scales, Platform Scales, Counter Scales, &c.
Send for price list, stating what you want.

SCREW DRIVERS OF ALL KINDS A SPECIALTY.

Send for Catalogue and Full List.
THE ELLRICH HARDWARE MANUFACTURING CO.,
HARDWARE SPECIALTIES,
Plantville, Conn.



PRESSED WROUGHT IRON.



THE BEST AND CHEAPEST

Made by
CLEVELAND CITY FORCE & IRON CO.,
Cleveland, Ohio.

AMERICAN CUTLERY CO.,

MANUFACTURERS OF



FINEST

QUALITY

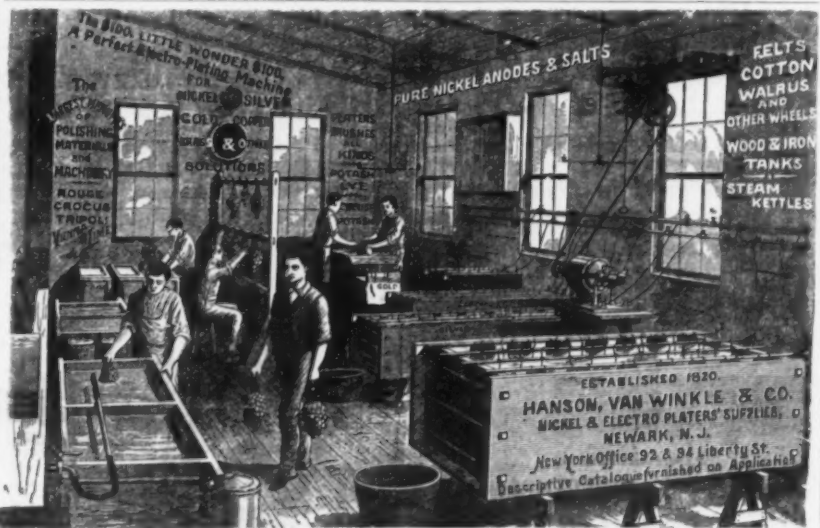
CARVERS

TABLE CUTLERY,

BUTCHER, COOK AND CARVING KNIVES.

177 to 191 Mather Street, CHICAGO.

WRITE FOR CATALOGUES.



NEW CHAMPION FORCE PUMP

Vacuum Chamber and Air Chamber,

Producing a continuous flow of water, both in suction and discharge. Works smoother and easier than any other force pump in the market. Has Seamless Drawn Brass Cylinders and no stuffing boxes. Never freezes in winter, and is not liable to get out of order. With Hose Attachment it is valuable as a fire protection, and for sprinkling lawns, gardens, &c. It is specially adapted for all kinds of wells—dug, drilled or driven—and for pumping water long distances from springs.

CLARK'S IMPROVED Ratchet Stocks, Dies & Pipe Vises

FOR USE BY
Plumbers, Gas Fitters and Pump Dealers.

With the Ratchet Stock pipe can be threaded in a corner, down in wells, or in positions that would be inaccessible with other tools. Send for Circulars and Price Lists to

CLARK BROTHERS, Mfrs., Belmont, N. Y., U. S. A.

JOHN T. LEWIS & BROS.

No. 231 South Front St., Phila.



TRADE MARK.

MANUFACTURERS OF

PURE WHITE LEAD,
RED LEAD, LITHARGE, ORANGE MINERAL, LINSEED OIL and PAINTERS' COLORS.

JOHN JEWETT & SONS,
MANUFACTURERS OF THE WHITE LEAD. WELL-KNOWN BRAND OF



TRADE MARK.

ALSO MANUFACTURERS OF

LINSEED OIL.
181 Front Street, New York.



THE ATLANTIC WHITE LEAD and LINSEED OIL CO.

MANUFACTURERS OF
WHITE LEAD (Atlantic), RED LEAD, LITHARGE, GLASS MAKERS' LITHARGE and ORANGE MINERAL
Raw, Refined, LINSEED OIL and Boiled

ROBERT COLGATE & CO.,
287 Pearl St., New York.



EXCELSIOR AND CLIPPER
LAWN MOWERS HAND GUARANTEED THE BEST & CHEAPEST IN THE MARKET.
MOWERS 10 to 20 IN. HORSE MOWERS 25 to 40 IN.
CHADBORN & COLDWELL MANUFACTURING CO.
NEWBURGH, N. Y.

I. S. SPENCER'S SONS, GUILFORD, CONN.,
Manufacturers of
SCALES, BUILDERS' HARDWARE, LIGHT HARDWARE
And all kinds of
Light Grey Iron and Brass Castings of Superior Quality and Finish.
CORRESPONDENCE SOLICITED.

Grindstones, Emery, &c.

GEO. H. WORTHINGTON, Pres. and Treas. WM. McDERMOTT, V. Pres. and Sec.

Berea & Huron Stone Company,
Manufacturers of

GRINDSTONES,
MOUNTED STONES,
SCYTHE STONES, &c.

OFFICE: 71 & 72 Wilshire Building, CLEVELAND, OHIO.

Walter R. Wood, GRINDSTONES,
Berea, O., Nova Scotia & other brands.

283 and 285 Front St., New York.

GEO. CHASE.

Genuine Green Paper Brand Wash-Ita Stone is the Best

OIL STONE.
107th St., Harlem River, N. Y.

Miller, Metcalf & Parkin,
PITTSBURGH, PA.,
Manufacturers of
CRESCENT STEEL,
IN BARS, SHEETS, COLD-ROLLED STRIPS, &c.
Polished, Compressed Drill Rods and Wire.
Warranted equal to any imported in quality, finish and accuracy.
Also Common Grades.

S. & C. WARDLOW SHEFFIELD, ENGLAND,
MANUFACTURERS OF THE CELEBRATED
Cast and Double Shear Steel
In Bars, Sheets and Coils, for fine Pen and Pocket Cutlery, Razors,
Table Knives, Mining Tools, Dies, Files, Clock, Watch
and other Springs, and Sole Makers of the
Special Brand "Tough" Cast Steel for
Turning and other Tools.

OFFICES AND WAREHOUSE,
95 JOHN STREET, NEW YORK.

FRANK S. PILDITCH, Agent.

JESSOP'S BEST TOOL STEEL.
WILLIAM JESSOP & SONS, Limited, 91 John St., New York.

W. W. SCRANTON,
President.

WALTER SCRANTON,
Vice-President.

E. P. KINGSBURY,
Sec'y and Treas.

THE SCRANTON STEEL COMPANY,
MANUFACTURERS OF
Steel Rails and Billets.

Works at SCRANTON, PA.

NEW YORK OFFICE
47 BROADWAY.

J. M. SCHOONMAKER.
MANUFACTURER AND SHIPPER OF

CONNELLSVILLE

COKE

Capacity of Mines, 2500 Tons Daily.

Siding connections with all lines of Railroads.

Office, 120 Water Street, PITTSBURGH, PA.

Perkins Improved Toe Calks.

MANUFACTURED BY

RHODE ISLAND HORSE SHOE CO.,
PROVIDENCE, R. I.

Made without
Waste,
and Sold at a
Reasonable
Price.



Prong does not
Enter
(and weaken)
the Shoe
at the crease.

FULL SIZE CUT, NO. 6 MEDIUM.

Made in three lengths, viz., Short, Medium and Long, each pattern in a variety of
sizes, both Blunt and Sharp. Patented Feb. 17, 1885. Prices quoted on application.

HAVING STOOD THE TEST OF 135 YEARS COMPETITION, THEY ARE IN HIGHER REPUTE THAN EVER.

JOHN WILSON'S CELEBRATED BUTCHERS' KNIVES & BUTCHERS' STEELS

ARE USED IN ALL
THE PRINCIPAL SLAUGHTERING AND MEAT PACKING ESTABLISHMENTS OF
THE UNITED STATES OF AMERICA, & THE AUSTRALIAN COLONIES;

AND, WITH HIS EQUALLY CELEBRATED SHOE KNIVES HAVE FOUND THEIR WAY, AND CARRY HIS
INTO ALL THE COMMERCIAL MARKETS OF THE WORLD.

BEWARE OF CLOSE IMITATIONS OF THE KNIVES; ALSO OF COUNTERFEITS OF THE MARK, AS BOTH HAVE BEEN, AND ARE, FREQUENTLY ATTEMPTED.

WORKS:--SYCAMORE STREET, SHEFFIELD, ENGLAND. Established 1750.

Richmond Weather Strip Co.,



MANUFACTURERS OF
ROWLETT'S INDEPENDENT
Automatic Counter-Balanced
WEATHER STRIP.

(Awarded Bronze Medal at Cincinnati
Industrial Exposition, 1884.)
Has no Springs, Triggers or Circle Irons; Positive
Action; Cannot go out of order; Fits any Door.
Agents wanted in every city and town in the U. S.
Send stamp for circular. Address
Richmond Weather Strip Co., Richmond, Ind.
P. O. Box 262. Factory, 217 N. 6th St.
Mention this paper.

G. W. Bradley's Edge Tools.

Butchers' Cleavers,
Butchers' Choppers,
Axes and Hatchets,
Grub Hoes and Mattocks,
Mill Picks,
Box Chisels and Scrapers,
Ring Bush Hooks,
Ax Eye Bush Hooks,
Socket Bush Hooks,
Watt's Ship Carpenters' Tools,
Carpenters' Drawing Knives,
Coopers' and Turpentine Tools.

FOR SALE BY

MARTIN DOSCHER, Agent, 95 Reade Street, New York.

STEEL Gautier Steel.
SEE PAGE 3.

LABELLE STEEL WORKS.
SMITH BROS., & CO.,
MANUFACTURERS OF ALL KINDS OF
STEEL.

ALSO SPRINGS, AXLES, RAKE TEETH, &c.

Office and Works, Ridge, Lighthill & Belmont Sts., and Ohio River, Allegheny.

POST OFFICE ADDRESS, PITTSBURGH, PA.

Represented at Boston by WETHERELL BROS., 31 Oliver St.; at Philadelphia by JAMES C. HAND & CO., 614
and 616 Market St.; at Cleveland by CONDIT, WICK & CO., 153 Water St.

TROY STEEL AND IRON CO.,
TROY, N. Y., Manufacturers of
BESSEMER STEEL RAILS,
Fish Plates, Bolts, Nuts, Spikes, &c. Machinery
Steel, Merchant and Ship Iron.

CHESTER GRISWOLD, Pres't, Duncan Building, 11 Pine St., N. Y. City.

FRANCIS HOBSON & SON,
97 JOHN STREET, NEW YORK.

Sole Manufacturers of "CHOICE" EXTRA CAST STEEL.

MANUFACTURERS OF

Warranted Best Cast Steel

FOR TOOLS AND DIES, AND

"CHOICE" EXTRA NEEDLE WIRE.
DON WORKS, SHEFFIELD, ENGLAND.

CHAS. HUGILL, Agent.

NEWTON & SHIPMAN,
83 JOHN ST., NEW YORK.
GENERAL AGENTS FOR
STEEL "F. W. MOSS" FILES.
AND
"MOSS & GAMBLE'S" FILES.

THE MONTGOMERY IRON & STEEL COMPANY,



WORKS AT DANVILLE, PA.

PIG IRON, T AND STREET RAILS,

RAIL JOINTS AND SPIKES,

Bar Iron, Mine Car Wheels, Axles and Breaker Machinery.

W. E. C. COXE, President, Reading, Pa.

F. P. HOWE, Gen'l Supt., Danville, Pa.

Pittsburgh Bessemer Steel Co.
(LIMITED.)

STEEL RAILS

LIGHT RAILS A SPECIALTY.

P. O. Address, 48 FIFTH AVE., Pittsburgh, Pa.

R. MUSHET'S
SPECIAL STEEL

FOR

LATHES, PLANERS, &c.,

Turns out at least DOUBLE WORK by increased speed
and feed, and CUTS HARDER METALS than any other
Steel. Neither hardening nor tempering required.

SOLE MAKERS,

SAMUEL OSBORN & CO.,
SHEFFIELD, ENGLAND.

Represented in the United States by

B. M. JONES & CO.,
Nos. 11 and 13 Oliver Street, BOSTON.

NAYLOR & CO.,

99 John Street, NEW YORK,
IMPORTERS OF

STEEL AND IRON RAILS,
Steel Tires and Axles, Tin and Terne Plates,
Swedish and Norway Iron,

BESSEMER STEEL AND IRON

WIRE RODS,

Pig Iron, Spiegeleisen, Ferromanganese,
Scrap Steel and Old Iron Rails.

SELLING AGENTS FOR

NORWAY STEEL AND IRON COMPANY, SOUTH BOSTON.

Manufacturers of

STEEL COMPRESSED SHAFTING.

"Benzon" Homogeneous Plates

FOR BOILERS, FIRE-BOXES, &c.

SPRING STEEL

And all other kinds of

Martin-Siemens Steel and Iron.

The Iron-Masters' LABORATORY.

Exclusively for the

Analysis of Ores of Iron, Pig and Manufac-

tured Iron, Steels, Limestone, Clays,

Slags and Coal for Practical

Metallurgical Purposes.

No. 339 Walnut St., Philadelphia.

With Branch at Warrenton, Virginia,

J. BLODGET BRITTON.

This laboratory was established in 1866, at the in-
stance of a number of practical Iron Masters, ex-
pressly to afford prompt and reliable information
upon the chemical composition of the substances
above mentioned, for smelting and refining pur-
poses, the object being to make it at once a con-
venient, practically useful, and comparatively
inexpensive adjunct to the Furnace, Forge and
Rolling Mill.

BRIER HILL PIG IRON.

EASTERN AGENTS:

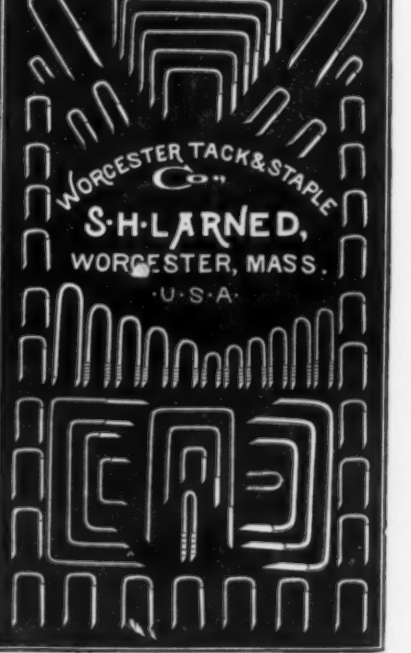
E. P. CUTLER & CO., 15 Oliver St., Boston, Mass.

JOHN L. HOGAN, 216 South 4th St., Philadelphia, Pa.

R. FRANKLYN & CO., No. 30 Pine St., New York, N. Y.

The BRIER HILL IRON and COAL CO.

YOUNGSTOWN, OHIO.



Cut one-half size.

A. PARDEE, Hazleton, Pa. J. G. FELL, Phila.

A. PARDEE & CO.,

237 South Third Street,

PHILADELPHIA.

No. 111 Broadway, New York.

MINERS AND SHIPPERS OF

LEHIGH COALS

The following superior and well-known Lehigh
Coals are mined by ourselves and firms connected
with us, viz.:

A. Pardee & Co., HAZLETON,

Pardee, Bro. & Co., CRANBURY,

Calvin Pardee & Co., SUGAR LOAF,

Pardee, Sons & Co., MT. PLEASANT.

THE AMERICAN
Wire Nail and Tack Machine

(PATENTED)

Claims advantages over other machines for gen-
eral simplicity, adjustment of cutters, both ver-
tically and horizontally, greater gripping power
through use of compound levers, positive adjust-
able knock-off, uniform feed and automatic barbing
attachment.

A. R. WHITNEY & CO.,

SOLE AGENTS,

56, 58 & 60 Hudson Street, New York.

WIRE STAPLES

IN EVERY VARIETY.

Chisel & Lancet Boardman Point.
Blind Staples a Specialty.

Send for Samples and Prices.

BINGHAMTON STAPLE WORKS

BINGHAMTON, N. Y.

F. A. HOAG, Propr.

THOS. FIRTH & SONS, Lim'd, SHEFFIELD, CRUCIBLE CAST STEEL.

JERE ABBOTT & CO.,

Agents and Importers of

SWEDISH IRON,

35 Oliver St., Boston. 23 Cliff St., New York.

GUSTAF LUNDBERG,

AGENT FOR

N. M. HÖGLUND'S SONS & CO.,

OF STOCKHOLM,

Swedish & Norway Iron

38 KILBY STREET, BOSTON.

ALBERT POTTS, Philadelphia Agent, 234 & 236 N. FRONT STREET.

PAGE, NEWELL & CO.,

139 Milk Street, Boston.

IRON, STEEL AND METAL MERCHANTS,

IMPORTERS OF

SWEDISH IRON,

Including Charcoal, Siemens-Martin and Bessemer Productions, Bars, Shapes, Rods, Billets, Blooms.

DELIVERIES MADE AT ALL PROMINENT AMERICAN, CANADIAN AND PROVINCIAL PORTS.

SWEDISH IRON AND STEEL.

(NORWAY)

LEWANDER & CO.,

AGENTS FOR

L. G. Bratt & Co., of Gothenburg, Sweden.

MAIN OFFICE:

12 Post Office Square, BOSTON, MASS.

BRANCH OFFICE:
154 Lake St.,
CHICAGO.

CHEMICALS AND APPARATUS

FOR THE ANALYSIS OF

ORES, IRON, STEEL, FUEL, FLUXES, FURNACE GASES, &c.,

Our Specialty. Being direct Importers and Manufacturers we can offer superior inducements.

EIMER & AMEND,

Nos. 205 TO 211 THIRD AVENUE,

NEW YORK.

Eighteenth Street Station Elevated Railroad.

Illustrated Catalogue Mailed on Application.



THE SWIFT MILL.

ESTABLISHED 1845.

The annexed cut shows one of the many styles of Coffee Mills of our manufacture, especially adapted to Grocers' use and all retailers of coffee. They are highly ornamental, and workmanship of the very best. We make more than 30 styles.

ALSO, LANE'S PORTABLE COFFEE ROASTER.

Will roast 30 to 40 lbs. at once, and can be used as a stove at other times. Send for descriptive list to Manufacturers.

LANE BROS., Poughkeepsie, N. Y.

Also Sold by Leading Wholesale Houses.

Our agents, John H. Graham & Co., 113 Chambers St., New York carry a full line of our goods, and will be pleased to serve you at factory prices.



Standard Tool Company,

MANUFACTURERS OF

STRAIGHT LIP INCREASE

Twist Drills

OF EVERY DESCRIPTION.

Sockets, Chucks, Screw

Driver Bits.

Special Drills

to Order.



ORDERS FOR

SPECIAL
MACHINERY AND TOOLS

SOLICITED.

Send Drawings and Specifications.

CLEVELAND, OHIO.



—THE—
SHUMARD SASH BALANCE CO.,
OFFICE, 1114 North E Street.

Shumard Sash Balance.

An article that entirely dispenses with Weights, Cords and Pulleys. Requires no boxes in Window Frames. Can be attached to any window, old or new. Holds the Sash at any height desired, and requires but a slight pressure to move it up or down. Are easily attached by an ordinary carpenter. Are the only durable, practical substitute for weights, and are appreciated on sight. Send for circular.

SHUMARD SASH BALANCE CO.,
Richmond, Ind.

THE LONDON IRONMONGER.

ESTABLISHED IN 1859.

THE IRONMONGER AND METAL * TRADES * ADVERTISER

PUBLISHED EVERY SATURDAY.

THE OLDEST AND CHIEF REPRESENTATIVE OF THE IRON, HARDWARE AND METAL TRADES.

OFFICE: 42 CANNON STREET, LONDON, E. C.

ADVERTISEMENTS AND SUBSCRIPTIONS ARE RECEIVED AT THE VARIOUS OFFICES OF "THE IRON AGE," NAMELY:
NEW YORK OFFICE: DAVID WILLIAMS, Publisher of *The Iron Age*, 83 Reade street, who will, on receipt of application, supply specimen copies free.

PITTSBURGH OFFICE: 77 Fourth Avenue—JOS. D. WEEKS, Manager and Associate Editor.
PHILADELPHIA OFFICE: 220 South Fourth Street—THOMAS ROBBSON, Manager.
CINCINNATI OFFICE: 11 West Third Street—HENRY SMITH, Manager.
SOUTHERN OFFICE: Cor. Eighth and Market Streets, Chattanooga, Tenn.—S. B. LOWE, Manager.
CHICAGO OFFICE: 36 and 38 Clark Street, Cor. Lake Street—J. K. HANES, Manager.

SPECIAL FEATURES.

Notes of Novelties.—This is a department of the journal always watched with interest by the trade, as it contains an account, from week to week, of the novelties which manufacturers and inventors are introducing to the notice of the trade. These articles are freely illustrated.
Special Correspondents.—The *Ironmonger* has a deserved reputation for its special correspondence from all the principal Continental, British and manufacturing centers. The writers are gentlemen holding important positions in the districts with which they are connected, and possess facilities for acquiring information specially suited for the columns of the *Ironmonger*. *The Week*, *Legal News*, *Trade Notes*, *Bankruptcies*, *Foreign Notes*, *Colonial Jottings*, *Merchants' Circulars*, &c., are each departments of the journal containing a digest of all matters of direct interest to the Iron, Hardware and Metal Trades. In addition to the above, there is a carefully classified list of Patents, together with Editorial Notes, French, Belgian and other Special Correspondence.

SUBSCRIPTIONS

to the *Ironmonger and Metal Trades' Advertiser*, with which is sent every fourth week the Foreign Supplement (see below), may commence from any date, but are not received for less than a year complete. The rate is \$5 per annum, inclusive of postage to any part of the world outside Great Britain. To every subscriber is presented, free, in the course of his year, a handsome and useful *Ironmongers' Diary and Text Book*, a work sold to non-subscribers at 75 cents.

By a mutual clubbing arrangement between the two journals, subscriptions to both will be received by either *The Ironmonger* or *The Iron Age* on the following terms:

THE IRONMONGER AND THE IRON AGE, Weekly.
In the United States and Canada.....\$7.50 or £1.10s | In Great Britain and Ireland.....\$5.50 or £1.2s | In other countries.....\$8.00 or £1.12s.
THE IRONMONGER, Weekly, and THE IRON AGE, Monthly
In the United States and Canada.....\$5.75 or 23s | In Great Britain and Ireland.....\$3.25 or 13s | In other countries.....\$5.75 or 23s.

ADVERTISEMENTS

are inserted in the *Ironmonger and Metal Trades' Advertiser* at the subjoined rates, from which no variation can be made on any ground whatever.

Size of Page—Nine Inches Deep by Six Inches Wide.

One Advertisement of every Series of 13 Monthly, 27 Fortnightly, or 53 Weekly, will be inserted in the *Ironmongers' Diary and Text Book*, published toward the end of each year, and presented to every Subscriber.

	53 INSERTIONS, each net.	27 INSERTIONS, each net.	13 INSERTIONS, each net.	7 INSERTIONS, each net.	3 INSERTIONS, each net.	1 INSERTION net.
One page.....	\$20.00	\$22.50	\$25.00	\$30.00	\$35.00	\$50.00
Two-thirds page.....	15.00	16.90	18.75	22.50	26.25	37.50
Half page.....	11.00	12.40	13.75	16.50	19.25	27.50
One-third page.....	8.00	9.00	10.00	12.00	14.00	20.00
Quarter page.....	6.40	7.25	8.00	9.60	11.20	16.00
One-sixth page.....	4.50	5.10	5.65	6.75	7.75	11.30
One-eighth page.....	3.60	4.10	4.50	5.40	6.25	9.00
One-sixteenth page.....	2.00	2.25	2.50	3.00	3.50	5.00

SPECIAL ISSUES.

In the spring and autumn of each year there is published a special issue, the circulation of which is not less than Twelve Thousand (12,000) copies.

THE IRONMONGERS' DIARY AND TEXT BOOK.

This is an annual, presented free to every Subscriber to the *IRONMONGER AND METAL TRADES' ADVERTISER*. It contains a large number of ruled skeleton pages for diary and other entries, and in addition much useful reference information, varied from year to year. It is handsomely bound in cloth, gilt; and as copies are used in thousands of establishments for a whole year, it is obviously a medium of exceptional value for advertisements. Sold to non-subscribers at 75 cents.

THE FOREIGN SUPPLEMENT,

With which is incorporated The Universal Engineer,

is published every fourth week in connection with the extensive and world-wide circulation of the *Ironmonger* itself. The dates of its publication for the next twelve months will be as follows:
NOVEMBER 28, DECEMBER 26, 1885, JANUARY 23, FEBRUARY 20, MARCH 20, APRIL 17, MAY 15, JUNE 12, JULY 10, AUGUST 7, SEPTEMBER 4, OCTOBER 2, OCTOBER 30 and NOVEMBER 27, 1886. This supplement is published in

FOUR LEADING COMMERCIAL LANGUAGES

of the world, including English, and is sent to all the countries where they are spoken, thus placing the contents of the *Ironmonger* not only within reach, but in the native language of eighty millions of German, twenty-eight millions of Italian, and fifty-one millions of Spanish speaking people; or in all, over two hundred millions of inhabitants in the principal nations where the best purchasers of manufactured goods are to be found.

Advertisements are inserted in any language at the following

MODERATE TARIFF.

Size of Page—13½ Inches Deep by 9½ Inches Wide.

	13 INSERTIONS, each net.	7 INSERTIONS, each net.	3 INSERTIONS, each net.	1 INSERTION, net.		13 INSERTIONS, each net.	7 INSERTIONS, each net.	3 INSERTIONS, each net.	1 INSERTION net.
One page.....	\$37.50	\$45.00	\$52.50	\$75.00	Quarter page.....	\$12.00	\$14.50	\$16.90	\$24.00
Two-thirds page.....	28.15	33.75	39.25	56.25	One-sixth page.....	8.50	10.00	11.65	16.65
Half page.....	20.75	24.75	28.90	41.25	One-eighth page.....	6.75	8.15	9.35	13.50
One-third page.....	15.00	18.00	21.00	30.00	One-twelfth page.....	5.00	6.00	7.00	9.75
					One-sixteenth page.....	3.75	4.50	5.25	7.50

Advertisers will do well to use illustrations freely. Where economy of space is an object, a left page illustrated and described in one language, can be suitably described in four or more languages on the opposite or right page without illustrating.

THE WHOLE FOREIGN HARDWARE TRADE,

so far as our experience of more than twenty years is concerned, will be covered by THE FOREIGN SUPPLEMENT at least twice a year. Thus a Price List or Advertisement inserted in the *Ironmonger* and FOREIGN SUPPLEMENT is a strikingly powerful and most efficient way of publicity, not to be compared with any of the other ordinary channels of communication.

WELDED CHROME STEEL & IRON (5 PLY) FOR SAFES VAULTS & C.



LIESCHE'S
Burglar-Proof Sash Lock
AND
Automatic Window Holder.
Cheapest, Strongest and Only Practical Automatic
Lock and Holder on the Market.
SAMPLES FREE TO THE TRADE.
J. R. CLANCY, Syracuse, N. Y.

JAMES HILL,
MANUFACTURER OF
GALVANIZED
BUCKETS,
AND
ASH CANS
A Specialty.
Providence R.I. P. O. Box 770

FRUIT WINE

& JELLY PRESS
 TWENTY DIFFERENT SIZES FROM \$2 TO \$100
 AWARDED FIRST PREMIUM EVERYWHERE
 No. 20 COFFEE MILL

MOLASSES

SAUSAGE STUFFER
SELF MEASURING FAUCET
ENTERPRISE MFG. CO.
 THIRD & DAUPHIN STS. PHILADELPHIA, PA.
 Mrs. Potts' **COLD HANDLE SAD IRONS**
 SOLD BY ALL HARDWARE DEALERS
 SEND FOR ILLUSTRATED CATALOGUE FREE

SMOKED

BEF SHAVER

BUNG HOLE

BORER TOBACCO
MEAT CHOPPER
& ROOT CUTTER

WROUGHT IRON TACKLE BLOCKS,
 Swivel Hooks for Rope or Chain,
 Polished Grooves, all Sizes in Stock.
 ALSO
PULLEY BLOCKS FOR WIRE ROPE.
 HEADQUARTERS FOR THE
 Irving Brand Wooden Pulley Blocks.
McCOY & SANDERS,
 Manufacturers,
 26 WARREN STREET, NEW YORK.

Fixed! You Bet I'm Fixed!!
 With the largest line of ROLLER SKATES in the World,
 AT PRICES THAT DEFY COMPETITION.
 Prices way below price of any first-class skate in the market.
 Over 300,000
 Now in use and giving perfect satisfaction.

Send for latest prices and large illustrated Catalogue which illustrates and describes five different kinds of Roller Skates—One of Park or Street Skate—and six styles of Spring Steel and Extension Club Skates; Rubber Wheels, Skate Cases, Bags, Skating Caps, Oil Cans, &c.
 Our Steel Cased Rubber Wheels have brass hub, steel casing, and best quality of rubber of sufficient hardness to make them very light running. They are made to fit all styles and sizes of skates, and are especially adapted for playing Polo, Football, &c. They are also extensively used for Blank purposes, as they are noiseless, durable, and will not slip or wear the floor. We are Patented and manufacture more styles of Skates than any manufacturer in the World. Address

KITSELMAN BROS., Ridgeville, Ind.

E. M. BOYNTON SAW AND FILE CO.
 NEW YORK CITY. PATENTED NOV. 25, 1884.
 100,000 SOLD.
 This is the only authorized INCORPORATED "E. M. Boynton Saw and File Co." in the World. Newly incorporated January 26th, 1885.

THE CUT ABOVE represents our latest patent "Wonder" Cross-Cut Saw, of which style of teeth we shall use for our Cross-Cut One-Man Pruning and Buck Saw. This tooth has all the direct fast cut of the Lightning, combined with the clearing teeth of the Champion, making it, as its name indicates, the Latest Wonder, and by actual test we decide an advantage of 20 per cent. over our former world-renowned Lightning Saw. Having newly organized January 26th, 1885, as the E. M. Boynton Saw and File Co., we shall be prepared to fill any orders for the above, as well as for goods which have been furnished our customers throughout the world for the last 14 years.

Respectfully yours,
E. M. BOYNTON SAW AND FILE CO., 99 Chambers St., New York.

THE SHAW DOOR CHECK AND SPRING.
 GREAT REDUCTION IN PRICE.
 The SHAW DOOR CHECK AND SPRING CO have removed to their new factory, and with their increased facilities for manufacturing their goods have decided to reduce the price of each Spring \$1 from former list, and thereby bring the machine within the reach of all. The SHAW CO. are the owners of the oldest patented device for closing doors noiselessly, and with their new improvement produce the only check and spring which the trade can sell as general hardware. The same spring can be applied to either hinge or jamb side of both right or left hand doors.

SHAW DOOR CHECK AND SPRING CO.
 MANUFACTURERS AND SOLE AGENTS,
 Office and Factory, 164 High St., Boston, Mass.
 BRANCH OFFICES: 77 Reade St., New York; 239 Lake St., Chicago, Ill.

GEO. M. SCOTT,
Bellows Manufacturer,
 Johnson Street,
 Cor. 324 St.,
 CHICAGO, ILL.

B. KREISCHER & SONS,
FIRE BRICK.
 BEST AND CHEAPEST.
 ESTABLISHED 1846.
 Office, foot of Houston Street, East River, NEW YORK.

NEWTON & CO.,
 ALBANY, N. Y.,
 MANUFACTURERS OF BEST QUALITY
FIRE BRICK
 And STOVE LININGS.

M. D. VALENTINE & BRO.,
 MANUFACTURERS OF
FIRE BRICK
 And FURNACE BLOCKS,
 DRAIN PIPE AND LAND TILE,
 Woodbridge, N. J.

BORGNER & O'BRIEN,
 MANUFACTURERS
FIRE BRICK
 AND
 Edge Pressed Furnace Blocks,
 Clay Retorts, Tiles, &c.
 Twenty-third Street, Above Race, PHILADELPHIA.
 Twenty years' practical experience.

ESTABLISHED 1848.
TROY FIRE BRICK WORKS,
 Troy, N. Y.
James Ostrander & Son,
FIRE BRICK,
 Tiles, Blast Furnace Blocks, &c., and in a Special Department Linings for Stoves, Ranges and Heaters of superior quality. Miners and dealers in Woodbridge, N. J., Fire Clay and Fire Sand and Staten Island Kaolin. See also Page 52.

ESTABLISHED 1864.
JAMES GARDNER,
 Successor to GARDNER BROS.,
 MANUFACTURER OF
"STANDARD SAVAGE" FIRE BRICK,
TILE & FURNACE BLOCKS,
 OF ALL SHAPES AND SIZES
 Miner and Shipper of "Mount Savage" Fire Clay.
 WORKS, Ellersville, Allegheny Co., Md.
 MAIN OFFICE, Cumberland, Md., P. O. Box 93.
 BRANCH OFFICE, Pittsburgh, Pa., P. O. Box 373.
 S. M. Hamilton & Co., Agents, Baltimore, Md.

UNION MINING COMPANY.
Mount Savage Fire Brick.
EDWARD J. KETING, Agent,
 229 South Third St., Philadelphia, Pa.

BIRMINGHAM FIRE BRICK WORKS.
 All dimensions constantly on hand. Fire Bricks, Fire Shapes, Kaolin, Fire Brick Cement, Fire Clay, Fire Sand for Furnaces; Coke Ovens, Stoves, Boilers, and for the Southern Trade generally.
STEVENS & FENTON, Prop'rs.
 Birmingham, Ala.

AIKIN & LIGHTON,
 Iron City Foundry and Machine Works,
 SOLE MANUFACTURERS OF
ADD'S IMPROVED
PATENTED

SAND MOULDING MACHINE
 BIRMINGHAM, ALABAMA.
 CORRESPONDENCE SOLICITED.

AMHERST
 THE WATER MOTOR
 BEST.
 Parties looking for a noiseless, economical and efficient power will do well to send for descriptive Catalogue, free.

Amherst Hydraulic Motor Company,
 HOLYOKE, MASS.

Self-Binders for The Iron Age.

THE IRON AGE
 Self-Binder.
 PRICES.
 Full Cloth, \$1.25
 Half Roan, \$1.50

We are now prepared to supply our subscribers with an excellent self-binder for their papers, a cut of which is annexed. We call attention to the low prices at which it is offered. Address all orders to
DAVID WILLIAMS,
 83 Reade Street, New York.

New England Butt Co.
 PROUTY'S PATENT
 RIGID
 Door Knobs
 AND
 Locks
 AND OTHER
Builders' Hardware,
 Catalogue Sent Free on Application. Providence, R. I., U. S. A.

EAGLE LOCK COMPANY,
 Salesroom at No. 98 Chambers St., New York, U. S. A.
 Manufactories at Terryville, Conn., and Geneva, Ohio.

MANUFACTURERS OF THE LARGEST VARIETY OF
CABINET, TRUNK and PAD LOCKS
 MADE BY ANY ONE CONCERN IN THE WORLD.
 Illustrated Catalogue Mailed to the Trade Free upon Application.
 Orders for special Die and Press Work and Small Brass Castings solicited at our Terryville Works.

P. LOWENTRAUT,
 MANUFACTURER OF
MECHANICS' TOOLS, GENERAL HARDWARE, HOUSE FURNISHING GOODS,
 36 to 64 Kent, Corner Brenner St., Newark, N. J.
"EUREKA" CLUB SKATES.
 (Patented April 19, 1881.)
 BEST
 Skates Made in This or Any Other Country.

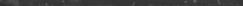
SIZES, 8, 8½, 9, 9½, 10, 10½, 11, 11½, 12 Inches.

This Skate is simple in its construction, and has many advantages over other Skates. The new principle of operating the clamps gives great strength to the clamping of the heel. The pressure bar in front of the heel has a curved form, which braces the instep of boot or shoe, and prevents the turning of the foot while skating. The plates are of welded steel, carefully tempered and hardened. The superior care in tempering and workmanship gives the "Eureka" advantages that no other Skate has.

WHITE MOUNTAIN FREEZER CO.,
 MANUFACTURERS OF
 Sands' Patent Triple Motion
WHITE MOUNTAIN ICE CREAM FREEZER.

The only Freezer ever made having three distinct motions, thereby producing finer, smoother Cream than any other Freezer on the market. Acknowledged by every one to be the best in the world. Over 300,000 in use to-day. Outside Irons Galvanized, but all inside the can coated with Pure Black Tin. Tube water-proof; easily adjusted and operated. We also carry large stock of Packing Tubs, Packing Cans, Ice Crushers, &c. Send for Price List and Trade Discounts. Address

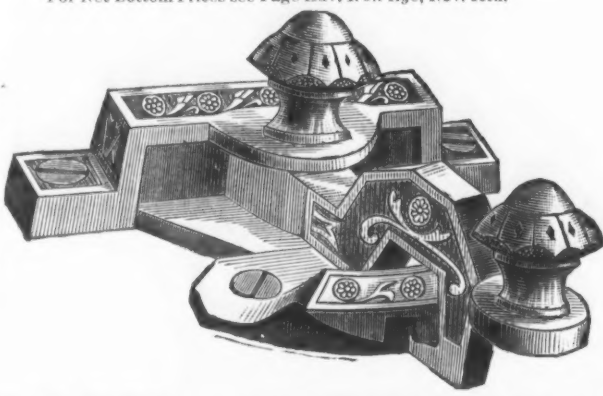
WHITE MOUNTAIN FREEZER CO.,
 101 E. Hollis St., Nashua, N. H.



1942

For Net Bottom Prices see Page Adv. Iron Age, Nov. 26th.

BURGLAR-PROOF SASH LOCKS.
(Patented Oct. 7th, 1879.)
FOR NET BOTTOM PRICES SEE PAGE AD.
IN IRON AGE, Nov. 26th.



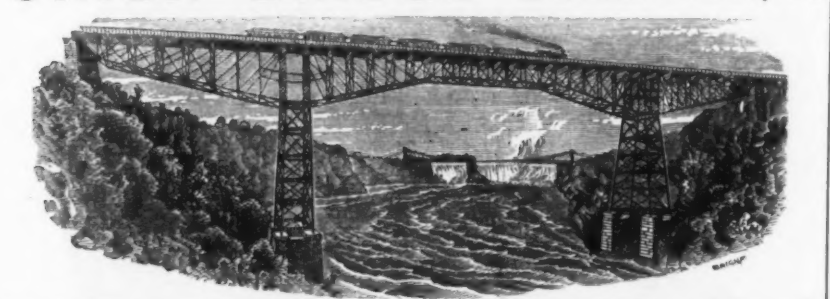
No. 210, Ornamental Iron, Iron Knob, fine finish, Etched, Crimson Old Gold Inlaid.....	\$0.50
No. 211, Ornamental Iron, Iron Knob, fine finish, Etched, Blue Old Gold Inlaid.....	.75
No. 212, Ornamental Iron, Iron Knob, fine finish, Etched, Green Old Gold Inlaid.....	.85
No. 213, Ornamental Iron, Iron Knob, Nickel-plated, Green Old Gold Inlaid.....	1.25
No. 214, Ornamental Iron, Iron Knob, Nickel-plated, Lemon Old Gold Inlaid.....	1.50
No. 215, Ornamental Iron, Iron Knob, Nickel-plated, Pale Old Gold Inlaid.....	1.60
No. 216, Ornamental Iron, Iron Knob, Nickel-plated, Fire Old Gold Inlaid.....	1.75
No. 217, Ornamental Iron, Iron Knob, Nickel-plated, Crimson Old Gold Inlaid.....	1.85
No. 218, Ornamental Iron, Iron Knob, Nickel-plated, Blue Old Gold Inlaid.....	1.90
No. 219, Ornamental Iron, Iron Knob, Nickel-plated, Green Old Gold Inlaid.....	1.95
No. 220, Ornamental Iron, Iron Knob, Nickel-plated, Copper Old Gold Inlaid.....	2.00
No. 221, Ornamental Iron, Iron Knob, Nickel-plated, Lemon Old Gold Inlaid.....	2.05
No. 222, Ornamental Iron, Iron Knob, Polished and Lacquered.....	2.50
No. 223, Ornamental Cast Brass, Nickel-plated.....	3.00

MANHATTAN HARDWARE CO.,

READING, PA., U. S. A.,
MANUFACTURERS OF
LOCKS Of Every Description,
AND A FULL LINE OF
GENERAL BUILDERS' HARDWARE.

Special net prices to be found in *Iron Age* whenever changes occur.
The only manufacturers in the United States who quote bottom prices to all dealers without favoring any class.
Fine Gray Iron Castings of every description, also Real Bronze and Brass Castings, made to order at very low prices; Pattern Making, Japanning, Bronzing, Tinning, &c.
Our goods are known and liked wherever sold.
Orders received will be filled at last prices quoted in *The Iron Age*.
We do no underhand business, but quote alike to all for quantities less than \$1000.
Our terms are strictly 15 days, f. o. b. Reading, no charge for cases or cartage.

UNION BRIDGE COMPANY.



Charles Kellogg, Thos. C. Clarke, C. S. Maurice, Geo. S. Field, Edmund Hayes, C. Macdonald.
CIVIL ENGINEERS
And Constructors of Iron and Steel Bridges, Viaducts, Roofs, Elevated Railroads, Marine Piers, Etc.

Works: Athens, Pa. Works: Buffalo, N. Y.
Late Kellogg & Maurice. Capacity, 14,000 tons. (Late Central Bridge Works.) Capacity, 15,000 tons.
DESIGNS AND ESTIMATES WILL BE SENT ON APPLICATION TO
UNION BRIDGE COMPANY, 18 Broadway, New York.

ESTABLISHED 1848.

TROY FIRE BRICK WORKS,

TROY, N. Y.

JAMES OSTRANDER & SON,
MANUFACTURERS OF

Best Quality Fire Brick, Blast Furnace Linings,
Tiles of All Kinds, &c., &c.

IN OUR NEW:

Special Stove Lining Department

We make Brick for Stove Linings which are not excelled by any on the market in
Quality, Appearance or Accuracy of Fit.

We do not apply to these goods any high-sounding name, but do claim that a trial of them will prove to any Stove Manufacturer in want of a really first-class article that our claims are supported by facts and will be borne out in actual results.

Our reputation gained in our business career is a guarantee of the superiority of the goods which our new department is putting on the market.

Correspondence solicited. See also page 50.

Steel Door Hangers

FOR EVERY PURPOSE.



Anti-friction Steel Barn Door Hangers.
Three sizes of Steel Common Hangers.
Anti-friction Steel House Door Hangers.
Heavy and Extra Heavy Anti-friction Hangers for Warehouses, Freight Depots, &c.
Anti-friction Steel Elevator Hangers for Iron or Wooden Doors.
Special shapes and sizes of Hangers made to order.
All Hangers made for either Iron or Wood Track.
Wrought-Iron, Lock-Joint, Round-Edge Hanger Track in any desired lengths and sizes.
Track Brackets, Stay Rollers, Combination Latches, Automatic Gate Hinges.
The most complete and finest line of these goods manufactured.
Prices the lowest. Catalogues and Lists on application.

SCRANTON MFG. CO., 68 to 74 W. Monroe St., Chicago.

BRAINERD & CO., Eastern Agents, 97 Chambers St., New York.

THE BEST IS THE CHEAPEST.

THE BRUSH-SWAN ELECTRIC LIGHT CO.,

W. L. STRONG, President. A. D. JULLIARD, Vice-President. C. P. WHITNEY, Secretary.
R. W. ABORN, Treasurer. JOHN B. POWELL, Gen'l Manager.

REMOVED to Nos. 204, 206, 208, 210 Elizabeth Street, New York.

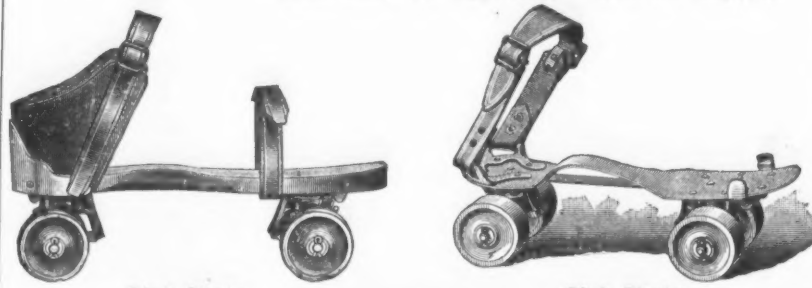
Where Electric Apparatus for all the various modes of lighting and transmitting of Power are in operation. No other system is as economical in installation and maintenance. No other Electric Light is as durable—the first machines made are still in daily operation.

The System Comprises
Arc Lights of various sizes.
Arc and Incandescent Lights from one Dynamo and Circuit.
Incandescent Lights of various sizes from special Dynamo for Central Station Lighting.
Cost of Apparatus greatly reduced. Surveys and Estimates by experts.

Eureka Roller Skate.

SOMETHING NEW.

Ball Bearing and Ratchet Movement.
Most Easy for Beginners. Best for Experts.



Rink Skate. MANUFACTURED BY Club Skate.

EUREKA SKATE CO., Richmond, Ind.

Send for Catalogue.

ROOT'S HANDY CLOTH-BOUND HARDWARE PRICE CARDS,

For Either Wholesale or Retail Trade.

COPYRIGHTED 1885.

These Cards have only been in print one month and have already reached a Second Edition on several numbers. They cover the lines having a large variety of sizes or numbers, avoid marking each package or article, in Retail Stores, and are very convenient for use in Wholesale Sample Rooms. They secure correct and uniform selling prices, save time, and no Hardware Dealer can afford to do without them. They are printed in very distinct type, on the best Ledger Paper, appropriately ruled with blue ink cross lines and red ink down rulings, for noting in pencil—List, Cost, Jobbing and Selling Prices. They are mounted on both sides of a tough, heavy card-board, especially adapted for this use, which is further protected on the four edges by being cloth-bound. Two-thirds of them are 3 x 13 1/2 inches. This size has been found convenient for hanging on any narrow surface, without hiding the goods. In the top of each Card a nickel-plated eyelet is firmly inserted.

PRICES IN SETS.

Set No. 1. Includes all the numbers, 1 to 32 inclusive.....	Price, \$10.00 per Set.
Set No. 2. Omits Cards Nos. 25, 26, 27, and includes all the other numbers described above.....	8.00 "
Set No. 3. For Dealers in Tinware and House Furnishing Goods, consists of Cards Nos. 25, 26, 27.....	2.00 "
Set No. 4. Includes the following Eighteen Leading Cards for Retail Trade: Nos. 2, 3, 9, 10, 11, 12, 13, 14, 15, 18, 19, 20, 22, 23, 24, 28, 31, 32.....	5.00 "

Write for a Circular giving detailed description and Price of each Card. They are sold separately at prices ranging from Twenty to Seventy Cents Each. Twenty numbers out of the Thirty-two are Thirty Cents Each. Unmounted Price Sheets can be furnished at half the Price of Mounted. Postage stamps can be enclosed for Sample cards or amounts of less than One Dollar. Full sets will be sent, subject to approval, to parties willing to prepay return charges on any numbers not suited to their use.

SENT, CHARGES PREPAID, ON RECEIPT OF PRICE, BY

T. W. ROOT, - Detroit, Mich.
Or DAVID WILLIAMS, 83 Reade St., New York.

Dog Collars,
Dog Muzzles,
Dog Whips,
Dog Combs,
Dog Brushes,
Dog Bells,
Dog Couplings,

And all Styles of Dog Furnishings.

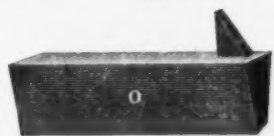
Send for Catalogue and Discount Sheet.

MEDFORD FANCY GOODS CO.,
101 Chambers St., New York.

I. BREMER, Gen'l Manager.

C. F. DEWICK & CO.,
Manufacturers of

PATENT STEEL
Toe Calks.



360 Dorchester Avenue, Boston, Mass.

J.F. WOLLENSAK'S PATENT TRANSOM LIFTER AND LOCK FOR ALL KINDS OF TRANSOMS, SKYLIGHTS, SEND FOR CATALOGUE AND PRICE LIST.
J.F. WOLLENSAK, PATENTED AND BUILT IN CHICAGO, ILL.

PORTABLE FORGES.

Send for Catalogue to

EMPIRE PORTABLE FORGE CO.,
COHOES, N. Y.

E.C. MEACHAM ARMS CO.
ST. LOUIS, MO.
Rink, \$2.00; Club, \$1.00
Send Post Office Order
Send money for Catalogue of Guns.

NORTH BROTHERS,

Iron Founders,
Light Castings a Specialty.

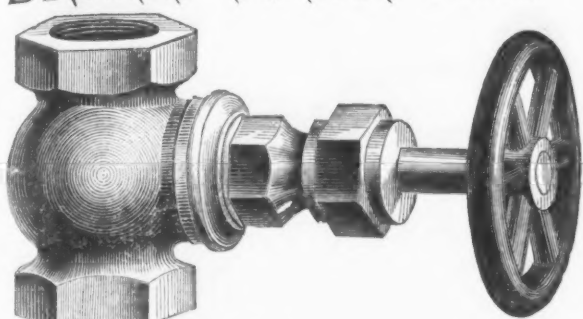
W. Cor. 23d and Race Streets,
PHILADELPHIA.
Correspondence solicited.

BOSTON.

Reported by Bigelow & Douse.

Anvil & Vice.....	10 20 30 40	dis 25
Cheney.....	\$2.00 4.50 6.50	dis 25
Eagle, Fisher & Norris, No. 00, \$1.75; 0, \$2.25; 1, \$2.75; 2, \$3.25; 3, \$4.00; 4, \$4.50; 5, \$5.25; 6, \$6.00; 7, \$6.50; 8, \$7.25; 9, \$8.00.....		dis 30
100 lb and over 10 lb.....		dis 30
Augers & Bits.....		dis 15
L'Hommedieu's Ship Auger.....		dis 15
Jennings' Bits.....		dis 25
Phook's Bits.....		dis 50
Shepardson's Double-Cut Bits.....		dis 45
Shepardson's Double Glimets.....		dis 40
Seaman's Extension Hollow Augers.....		dis 20
No. 2, \$4.80; No. 3, \$5.00; No. 4, \$5.20; No. 5, \$5.40; No. 6, \$5.60; No. 7, \$5.80; No. 8, \$6.00; No. 9, \$6.20; No. 10, \$6.40; No. 11, \$6.60; No. 12, \$6.80; No. 13, \$7.00; No. 14, \$7.20; No. 15, \$7.40; No. 16, \$7.60; No. 17, \$7.80; No. 18, \$8.00; No. 19, \$8.20; No. 20, \$8.40; No. 21, \$8.60; No. 22, \$8.80; No. 23, \$9.00; No. 24, \$9.20; No. 25, \$9.40; No. 26, \$9.60; No. 27, \$9.80; No. 28, \$10.00; No. 29, \$10.20; No. 30, \$10.40; No. 31, \$10.60; No. 32, \$10.80.....		dis 20
Bonney's Extension Hollow Augers.....		dis 20
Pierce Bits.....		dis 20
Griswold Bits.....		dis 20
Axes, Blue Jackets.....		dis 7.50
Dowse Handled Boys.....		dis 35
Ax Handles.....		dis 25
Oak Extra, 31 in., No. A.....		dis 25
Oak Extra, 34 in., No. B.....		dis 25
Oak Extra, 31 in., No. B.....		dis 20
Oak Extra, 34 in., No. B.....		dis 20
Oak Extra, 31 in., No. C.....		dis 140
Axle Clips.....		dis 50
Balances, Chatillon's.....		dis 40
Barn Door Rail.....		dis 25
Cast Angle for Anti-Friction Hangers.....		dis 25
Cast Half Round.....		dis 25
Wrought Round.....		dis 25
Bells, Connel's Crank Gong, reduced list, 1879.....		dis 20
Bird Cages.....		dis 40
Japaned M. B. & D., reduced list, 1879.....		dis 30
Brass M. B. & D., reduced list, 1879.....		dis 30
Blind Fastenings.....		dis 6.00
Shedd's.....		dis 6.00
Blind Hinges, Mail Hook, 3 holes.....		dis 7.00
Blocks, Tackle.....		dis 20
Brad Axl Handles.....		dis 20
Phoenix Adjustable.....		dis 20
Bolts, Norway Iron Carriage.....		dis 75
Common Carriage, new list.....		dis 75
Eagle Carriage.....		dis 75
Borax, Refined.....		dis 125
Boring Machines.....		dis 50
Eagle Upright, each.....		dis 50
Eagle Angle, each.....		dis 50
Braces, Barber's.....		dis 25
Spodford's.....		dis 50
Bracket Saws, Holly Scroll Saw.....		dis 25
Bracket Saws, extra quality, to No. 5.....		dis 25
Steel Frame, with patterns.....		dis 25
New Rogers, all iron.....		dis 25
Bracket Saw Blades, Griffith's pat., 7 grooves 7 1/2 in.....		dis 25
Brackets.....		dis 40
P. S. & W. Flower Pot, reduced list.....		dis 40
Watson's Cotton.....		dis 10
Watson's Wool.....		dis 10
Casters, Bed and Table.....		dis 10
Coil 3 1/2.....		dis 5
Coil 4.....		dis 5
Coil 5.....		dis 5
Coil 6.....		dis 5
Coil 7.....		dis 5
Coil 8.....		dis 5
Coil 9.....		dis 5
Coil 10.....		dis 5
Coil 11.....		dis 5
Coil 12.....		dis 5
Coil 13.....		dis 5
Coil 14.....		dis 5
Coil 15.....		dis 5
Coil 16.....		dis 5
Coil 17.....		dis 5
Coil 18.....		dis 5
Coil 19.....		dis 5
Coil 20.....		dis 5
Coil 21.....		dis 5
Coil 22.....		dis 5
Coil 23.....		dis 5
Coil 24.....		dis 5
Coil 25.....		dis 5
Coil 26.....		dis 5
Coil 27.....		dis 5
Coil 28.....		dis 5
Coil 29.....		dis 5
Coil 30.....		dis 5
Coil 31.....		dis 5
Coil 32.....		dis 5
Coil 33.....		dis 5
Coil 34.....		dis 5
Coil 35.....		dis 5
Coil 36.....		dis 5
Coil 37.....		dis 5
Coil 38.....		dis 5
Coil 39.....		dis 5
Coil 40.....		dis 5
Coil 41.....		dis 5
Coil 42.....		dis 5
Coil 43.....		dis 5
Coil 44.....		dis 5
Coil 45.....		dis 5
Coil 46.....		dis 5
Coil 47.....		dis 5
Coil 48.....		dis 5
Coil 49.....		dis 5
Coil 50.....		dis 5
Coil 51.....		dis 5
Coil 52.....		dis 5
Coil 53.....		dis 5
Coil 54.....		dis 5
Coil 55.....		dis 5
Coil 56.....		dis 5
Coil 57.....		dis 5
Coil 58.....		dis 5
Coil 59.....		dis 5
Coil 60.....		dis 5
Coil 61.....		dis 5
Coil 62.....		dis 5
Coil 63.....		dis 5
Coil 64.....		dis 5
Coil 65.....		dis 5
Coil 66.....		dis 5
Coil 67.....		dis 5
Coil 68.....		dis 5
Coil 69.....		dis 5
Coil 70.....		dis 5
Coil 71.....		dis 5
Coil 72.....		dis 5
Coil 73.....		dis 5
Coil 74.....		dis 5
Coil 75.....		dis 5
Coil 76.....		dis 5
Coil 77.....		dis 5
Coil 78.....		dis 5
Coil 79.....		dis 5
Coil 80.....		dis 5
Coil 81.....		dis 5
Coil 82.....		dis 5
Coil 83.....		dis 5
Coil 84.....		dis 5
Coil 85.....		dis 5
Coil 86.....		dis 5
Coil 87.....		dis 5
Coil 88.....		dis 5
Coil 89.....		dis 5
Coil 90.....		dis 5
Coil 91.....		dis 5
Coil 92.....		dis 5
Coil 93.....		dis 5
Coil 94.....		dis 5
Coil 95.....		dis 5
Coil 96.....		dis 5
Coil 97.....		dis 5
Coil 98.....		dis 5
Coil 99.....		dis 5
Coil 100.....		dis 5

McNab & Harlin Mfg. Co., MANUFACTURERS OF BRASS COCKS AND VALVES



For Steam,
Water,
and Gas.

WROUGHT IRON
PIPE & FITTINGS

Plumbers'
Materials.

Factory, Paterson, N. J.

56 John Street, N. Y.

Our new Illustrated Catalogue and Price List is now ready, and will be sent to the Trade with their first order, or by express, if desired, before ordering.

RIVETS
OF EVERY
DESCRIPTION, FIRST QUALITY.

W.P. TOWNSEND & CO.
NEW BRIGHTON, PA.

WM. H. HASKELL, President. E. S. MASON, Treasurer. D. A. HUNT, Agent.

WM. H. HASKELL CO., MANUFACTURERS OF GIMLET POINT COACH SCREWS



Bolts, Cold-Punched Nuts & Washers,
SUITABLE FOR MACHINERY OF ALL KINDS.

Office and Works: 277 Main St., PAWTUCKET, R. I., U. S. A.

HENRY B. NEWHALL CO., Agents,
105 Chambers St., New York. 47 Pearl St., Boston.

F. Armstrong, Bridgeport, Conn.



CATALOGUES AND PRICE LISTS FREE ON APPLICATION.

The American Nail Machine Co.,
MANUFACTURERS OF
AMERICAN PATENT
IMPROVED CUT NAIL MACHINES,
AUTOMATIC NAIL SELECTORS and NAIL
FACTORY SUPPLIES.
ASHTABULA, OHIO.

Prices and particulars furnished on application.

WM. McILVAIN & SONS,
MANUFACTURERS OF
BOILER PLATE
AND
CHARCOAL BLOOMS.

Locomotive, Fire Box, Flange and Shell
Iron; Plate for Bridges and Girders; Tank
and Stack Iron; Boat Plate and Iron for
Wrought Pipe; Plate Iron for Fire and
Burglar-Proof Safes.

TENSILE STRAIN: 56,000 to 64,000 lbs.
REDUCTION OF AREA—35 to 43 per cent.

Plates 1 1/4 inch thick to No. 14.
30 feet long.
70 inches wide.

VULCAN POWER HAMMER

TRUE, SQUARE, ELASTIC BLOW.
SOLID HELVE, RUBBER CUSHIONED.

DURABLE, LOW-PRICED.
Fulfills all the requirements of a First-class Hammer.

SEND FOR CIRCULAR TO THE MANUFACTURERS.
W. P. DUNCAN & CO., BELLEFONTE, PA.

Jarecki's Screw Plate and Pipe Cutter.

JARECKI MFG. CO., ERIE, PA.
Manufacturers of Malleable and Cast-Iron Pipe Fittings, Brass and Iron Valves and Cocks for Steam, Gas, Water and Oil; Pumps, Machinery and Supplies for Artesian Wells. Illustrated Catalogue on application.

G. A. CROSBY & CO.
MANUFACTURERS OF
Presses, Dies,
AND
Special Machinery
FOR
Sheet Metal Workers.
259, 261 & 263
RANDOLPH ST.
Chicago, Ill.

BROCK'S PATENT DROP FORGED CHAIN PIPE WRENCH.

MADE ENTIRELY OF BAR STEEL.

Six Sizes; adapted for Pipe from 1/4 to 14 inches diameter.
Each number will fit a range of sizes equal to six or more pairs of common wrenches, while it will outwear an equal number of any kind.
All parts are interchangeable, and can be readily renewed.

J. H. WILLIAMS & CO.,
Manufacturers of Every Description of Iron and Steel Drop Forgings,
9 RICHARDS ST. (Near Hamilton Ferry), BROOKLYN, N. Y.

North Wayne Tool Co.,
HALLOWELL, MAINE.

W. H. CARTER'S PATENT NEEDLE HAY KNIFE.
PAT. APR. 29, 1884.
IMPROVED BY M. M. BARTLETT.
Improvement Patented April 28, 1885.

SOLE MANUFACTURERS OF
Carter's Improved **NEEDLE HAY KNIFE,** THE BEST IN THE WORLD.

Improvement patented April 28, 1885, of which we are the sole manufacturers, has been tested with the most celebrated knives of other makers, and has proved an easier and faster Cutter than any other. Its special excellence consists in the chisel-edge tooth shown in the engraving. It may be used for cutting hay in the mow, stack and bale; also for ditching, cutting peat, or any other work for which a hay knife is used. It can be readily ground by the most inexperienced, as it requires to be ground only on one side. Should a tooth break, all that is necessary to replace the damage is to grind it once and a new chisel-tooth appears. It can ordinarily be sharpened with a common scythe stone. Try one and you will give it the preference.

SHIELDS & BROWN,
78 and 80 Lake St., CHICAGO, ILL. 132 Cedar St., NEW YORK.

FOR BOILERS AND STEAM PIPES.
Reduces condensation of STEAM.

FOR GAS AND WATER PIPES.
Prevents Sweating & Freezing.

BRADLEY'S INSULATED AIR COVERINGS
Awarded first and only Prize, Silver Medal, at the late National Railway Exposition.
Send for Illustrated Pamphlet, and mention The Iron Age.

P. BLAISDELL & CO., Worcester, Mass., Manufacturers of the

"BLAISDELL" UPRIGHT DRILLS
AND OTHER FIRST-CLASS MACHINISTS' TOOLS.

Send for new Catalogue of Specialties.

ALFRED BOX & CO.
312, 314, 316 Green St., PHILADELPHIA, PA.
Manufacturers of
Box's Pat. Double
Screw Hoists.
13,000 in use.

Many have done hard continuous duty years without a single part being renewed. This is the key of our success. They have built up a reputation themselves that cannot be approached. Our improved Radial Drills are also assuming the same standard.

1/2 Pair Chicago Double-Acting Spring Butts.
LIST JAPANESE.
1 in. per pair, \$1.20.
1 1/2 " " " " 1.50.
2 " " " " 2.50.
2 1/2 " " " " 3.00.
3 " " " " 5.00.
3 1/2 " " " " 12.00.

97 Chambers St., N. Y.
Chicago SPRING BUTT CO.,
Manufacturers of
Chicago SPRING BUTTS and KENNE
in Japan, Patented, Bronze or Brass.
Entire New Principle and of Great Power.
Send for Catalogue and Discounts.
OFFICES
167 Clark St., Chicago, Ill.

G. E. BRETTELL, Water Street, Rochester, N. Y.

Improved Planers a Specialty: 20 x 20, 22 x 22, 24 x 24, 26 x 26, 30 x 30, 36 x 36, to plane any desired length. Send for Description and Prices before purchasing.

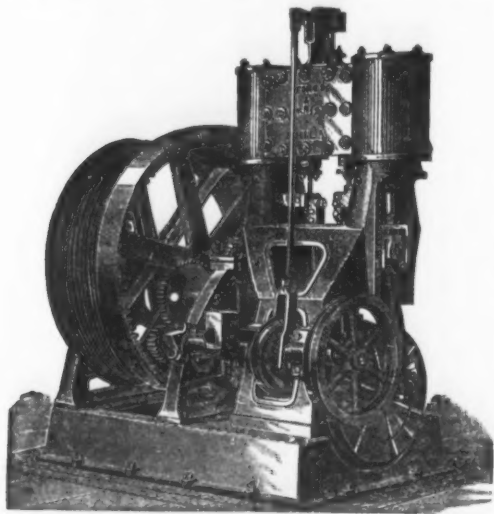
JOHN ADT & SON,
—BUILDERS OF—
HARDWARE MANUFACTURING MACHINERY.
Send for Catalogue.
NEW HAVEN, CONN., U. S. A.

HOWARD IRON WORKS, BUFFALO, N. Y., Manufacturers of

BENCH VISES

Price Lists sent on application.

PITTSBURGH MFG. CO.,
Manufacturers of Nail and Spike Machines, Box Nails, Washers Rivets, &c. Castings, Forgings and Blacksmith Work promptly attended to.
Office and Works Railroad St., near 28th Pittsburgh Pa.



**STOKES & PARRISH
MACHINE CO.,
PHILADELPHIA.**

ELEVATORS,

Passenger and Freight, Steam Hy-
draulic and Belt Power.

Hoisting Machinery

For Mines, Dock Use and Inclined
Planes. All kinds of Hoisting Ma-
chinery a Specialty.

**BLAST FURNACE
Hoisting Engines,**
With Vertical or Horizontal Cylinders,
for Handling Stock to Top of Stack
with One or Two Platforms.

WORKS AND OFFICE,
3001 Chestnut St., Philadelphia.
NEW YORK OFFICE,
93 and 97 Liberty Street.

E. W. BLISS,
MANUFACTURER OF
PRESSES AND DIES



AND
**SPECIAL
MACHINERY**

FOR
WORKING ALL SHAPES AND CLASSES OF SHEET METAL.

DOUBLE SEAMING MACHINES
FOR
Round, Square and Oval Cans.
**HAND AND POWER
CIRCULAR SHEARS.**
Foot and Power Squaring Shears.

20 PEARL STREET, BROOKLYN, N. Y.



THE STOCK, WORKMANSHIP, DESIGN AND FINISH



AND WE SO WARRANT THEM.

WE ALSO MAKE A SPECIALTY OF
TOOLS, FIXTURES AND GAUGES
For Manufacturing INTERCHANGEABLE Work, Such As
Guns, Pistols, Sewing Machines, &c.
R. H. BROWN & CO.,
NEW HAVEN, CONN.

ADJUSTABLE "DUPLEX" DIE STOCK, FOR PIPE AND BOLT.



NO NEED WORKING WITH DULL TOOLS. ONLY DIE STOCK WITH ADJUSTABLE SELF
Dies can be sharpened on Grindstones. CENTERING GUIDES.

SEND FOR CIRCULARS AND PRICES.

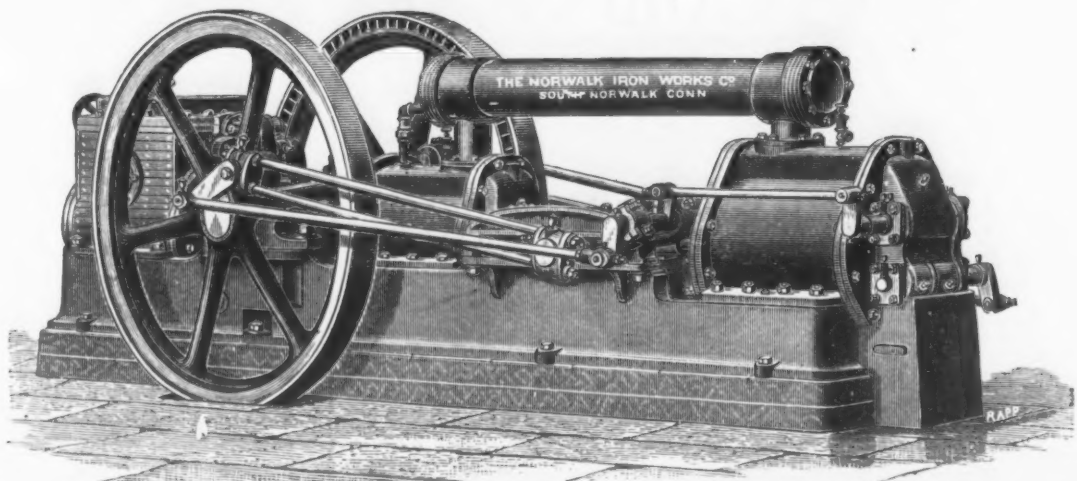
HART MFG. CO., Wilson Ave. & L. S. & M. S. R. R., Cleveland, Ohio.
Our Goods are Sold by the Leading Jobbers in all the Principal Cities.



IRON ROOFING.

Extra quality. Best plan in use. (Sold as low as any other
MANUFACTURED BY
T. C. SNYDER & CO., Canton, Ohio
Cheap, strong and durable. Does not get out of repair.
Every roof sold in even years satisfactory. Any mechanic
can apply it. Circular and sample free.
Also manufacturers of the best and cheapest Metallic
Paint in use.

Air Compressors.



THE NORWALK IRON WORKS CO., South Norwalk, Conn.

WALKER MFG. CO.



**SHAFTING,
HANGERS,
PULLEYS.**

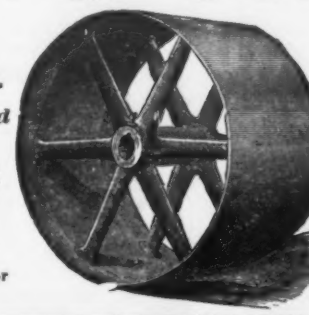
Pulley Castings and
Machine-Molded

GEARING

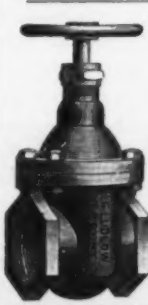
A SPECIALTY.

Cleveland - Ohio.

Estimates furnished. Write for
Gear and Price Lists A.



Established in 1874. 24 and 26 West Street, Cleveland, Ohio.
CLEVELAND TWIST DRILL CO. 101 Chambers Street, New York.
85 Queen Victoria St., London, Eng.



Ludlow Valve Mfg. Co.,
OFFICE AND WORKS:
938 to 954 River St. & 67 to 83 Vail Ave., Troy, N. Y.

VALVES.

Double and Single Gate, 1/4 in. to 48 in.—outside and inside Screws, Indicator, &c.
for Gas, Water, Steam and Oil. Yard and Wash Hydrants. Send for Circular. Also

FIRE HYDRANTS.



Morse Twist Drill and Machine Co.,
New Bedford, Mass.,
Sole Manufacturers of

Morse Patent Straight-Lip Increase Twist Drill,
Beach's Patent Self-Centering Chuck, Solid
and Shell Reamers, Bit Stock Drills,
DRILLS FOR COES, WORCESTER, HUNTER AND OTHER HAND DRILL
PRESSES. BEACH'S PAT. SELF-CENTERING CHUCKS, CENTER AND
ADJUSTABLE DRILL CHUCKS, SOLID AND SHELL REAMERS,
DRILL GRINDING MACHINES, TAPER REAMERS, MILLING
CUTTERS AND SPECIAL TOOLS TO ORDER.

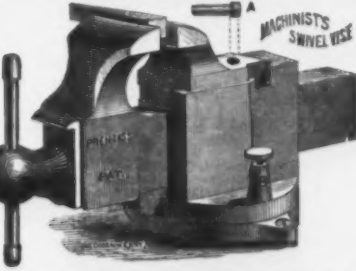
All Tools exact to Whitworth Standard Gauges.

GEORGE R. STETSON, Supt. EDWARD S. TABER, Treas.

MANNING, MAXWELL & MOORE,
Sole Sales Agents for THE MORSE TWIST DRILL AND MACHINE CO.'S



111 Liberty Street, NEW YORK.



PRENTISS' PATENT VISES,
ADJUSTABLE JAW,
Stationary or Pat. Swivel Bottoms,

Adapted to all Kinds of Vise Work, also

"PEERLESS" SWIVEL PIPE GRIP.

FITS ANY VISE. SOLD BY THE TRADE.

PRENTISS VISE CO.,
23 De. St., New York,

SOLE PROPRIETORS. SEND FOR CIRCULAR.

BORAX.
CHARLES PFIZER & CO.,

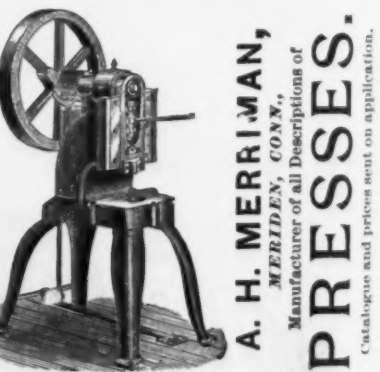
81 Maiden Lane New York,
Manufacturers of Refined and Dealers in Concentrated Borax.



RELiance HYDRAULIC JACKS,



DIENELT & EISENHARDT,
Makers,
1308 Howard Street, Philadelphia.



WORKSHOPS

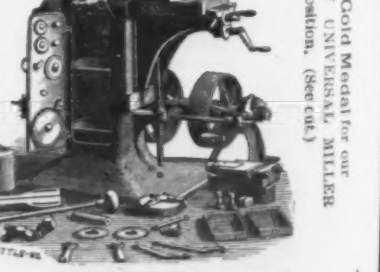
WITHOUT
STEAM POWER
SHOULD HAVE

BARNES'
Patent Foot Power Machinery. COMPLETE
Outfits for actual workshop business.

With them Builders, Cabinet
Makers, Metal and Wood Work-
ers compete with steam power.
Machines on trial if desired.

Proof of value, prices, full
detail, illustr'd catalogue, free.
W.F. & John Barnes Co.,
Rockford, Ill.

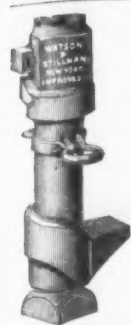
Address No. 69 Ruby St.
Dealers send for discount sheet.



E. E. GARVIN & CO.
Manufacturers of Machinists' and Iron Workers'
Tools, Lathes, Planers, Milling Machines and Drills
Special Tools for all kinds of manufacturing to order.

Gear and Rack Cutting, Milling and
Index Drilling to Order.
139 to 143 Centre St., New York.

Machinery, &c.



Hydrostatic Machinery,

JACKS, PRESSES, PUNCHES, ACCUMULATORS, PUMPS, VALVES, FITTINGS, &c.

POLISHING AND BUFFING MACHINERY,

WOOD WHEELS, &c

Patent Punches and Shears.

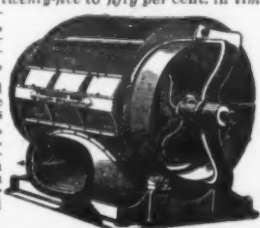
WATSON & STILLMAN, 470 B Grand St., N. Y.

THE MACKENZIE PATENT CUPOLA & BLOWER.

SEND FOR CIRCULAR TO
SMITH & SAYRE MFG. CO.,
PROPRIETORS,
245 Broadway, New York.



This Cupola has made a great revolution in melting iron. It differs from all others in having a continuous TUBE—i.e., in other words, the blast enters the fuel at all points. Above one ton capacity in 7 hours, they are made *cool* in form. This brings the blast to the center of the furnace with the least resistance and smallest possible amount of power, and in combination with the continuous TUBE causes complete diffusion of the air throughout the furnace, and uniform temperature, melting ten or fifteen tons an hour with the pressure of blast required to melt two or three tons in an ordinary Cupola. It also enables us to save very largely in time and fuel, the experience of our customers showing a gain of twenty-five to fifty per cent. in time and twenty-five to forty per cent. fuel over the ordinary Cupola, and a BETTER QUALITY OF CASTING, especially in light work. This is due to the thorough diffusion of the air and more perfect combustion, extracting less carbon from the iron, making a softer and tougher casting. We manufacture these Cupolas of any desired capacity, numbered from 1 to 20, inclusive, the numbers indicating the melting capacities in tons per hour—No. 1, one ton; No. 2, two tons; No. 3, three tons per hour, and so on up to 20 tons. We have improved the construction of these Cupolas in every way, have increased their strength and durability, and sought to make them as convenient for working and repairs as our own and the experience of our customers could suggest.



MORSE ELEVATOR WORKS.

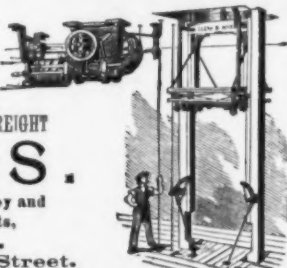
MORSE, WILLIAMS & CO.

Successors to CLEM & MORSE,

Manufacturers and Builders of all kinds of PASSENGER and FREIGHT

ELEVATORS.

OFFICE: 411 Cherry Street. WORKS: Frankford Ave., Wilkey and Shackamaxon Streets, PHILADELPHIA.
New York Office: 108 Liberty Street.



Established 1867.

E. Harrington, Son & Co.,

Works and Office,

Cor. N. 15th St. & Penn. Ave.,

PHILADELPHIA, PA., U. S. A.,

Manufacturers of

Patent Extension

LATHES,

Iron Planers,

BORING MILLS

DRILLS,

And a variety of other

Machinists' Tools.

Patent Double Chain Screw

Pulley Blocks, unrivaled for du-

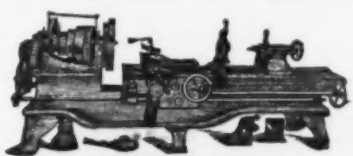
rability, safety and power.

Patent Double Chain Quick-

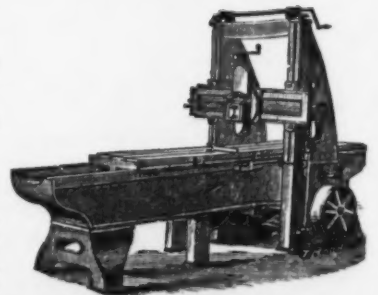
Lift Hoists, with brake for quick

and easy lowering.

Circulars furnished.



EXTENSION LATHE.



IRON PLANNER.

STEAM PUMPS
SEND FOR PRICES TO
VALLEY MACHINE CO. EASTHAMPTON, MASS.

DEAN BROS.' STEAM PUMP WORKS.

INDIANAPOLIS, IND.
PUMPING MACHINERY FOR ALL PURPOSES.
BOILER FEEDER, BREWERS' AIR PUMP, FIRE PLUM, VACUUM PUMP.
SEND FOR CATALOGUE AND PRICES.

Machinery, &c.

William Sellers & Co.,

ENGINEERS.

PHILADELPHIA,

MAKERS OF

MACHINE TOOLS

FOR WORKING IRON AND STEEL.

Steam Hammers; Riveting, Bending and Plate

Planing Machines; Punches and Shears; Lathes; Drilling,

Boring, Slotting, Shaping and Planing Machines, &c., &c.

Improved System of Shafting for Transmitting Power.

Specifications, Photographs and Prices Furnished on Application.

BRANCH OFFICES.

79 Liberty Street, New York City, Colorado Springs, Colorado.

SOUTHWARK FOUNDRY AND MACHINE CO.,

ENGINEERS AND MACHINISTS,

430 WASHINGTON AVENUE, PHILADELPHIA, PA.

PORTER-ALLEN and SOUTHWARK ENGINES,

BLOWING ENGINES, SUGAR MACHINERY, PUMPS, HYDRAULIC MACHINERY, &c., &c.

BOILERS

BOILERS REPAIR ENLARGED STATIONARY OR PORTABLE. HARRISON SAFETY BOILER WORKS. GENERAL AGENTS: CLYDE & DENTON, 211 FINE MARKET ST., PHILA.

Double Acting BUTTS

SABIN'S LEVER DOOR SPRINGS,

Coil, and Sabin's Volute Springs

For various purposes made to order.

SABIN MACHINE CO., Montpelier, Vt.

THE CLERK GAS ENGINE.

Highest Award for Gas Engines at American Institute Fair, New York, 1883.

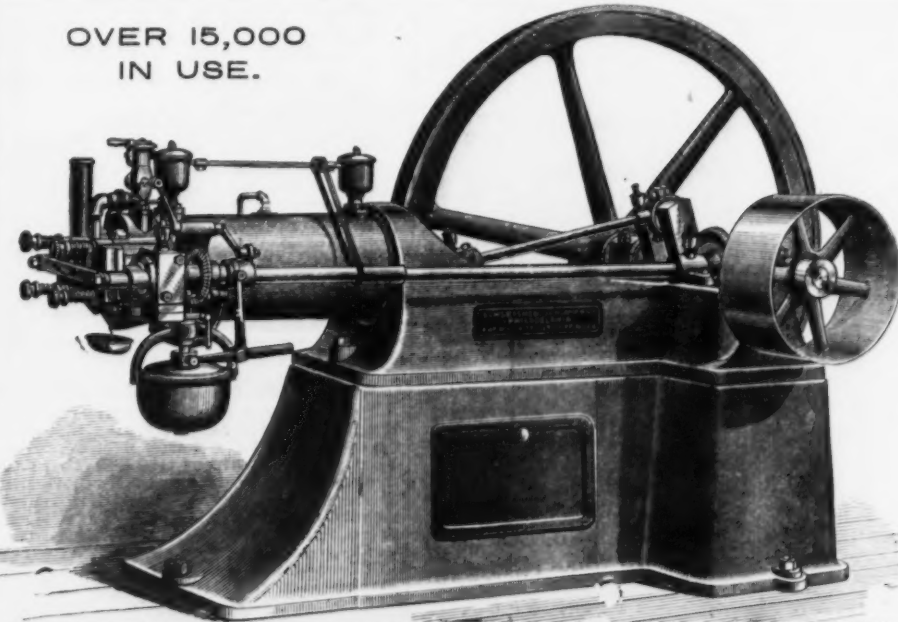


Makes an ignition at every revolution of the Fly Wheel. Is started with ease, and gives full power immediately. No danger from fire; no extra insurance nor skilled engineer required. Runs perfectly steady; only uses gas when required. Workmanship of the best description and guaranteed. Indicated power considerably larger than in any other Gas Engine of the same size, each Engine giving from 1 H.-P. to 4 H.-P. more than named. Is unsurpassed by any other Gas Engine for running any kind of machinery or electric light, arc or incandescent. Has means for regulating to suit any coal or water gas.

No Boiler, Coal, Ashes or Engineer. Made in Sizes of 4, 8, 10, 15 and 25 H.-P.

THE CLERK GAS ENGINE CO., 1012-1016 Filbert St., Philadelphia.
Branch Offices: 142 Chambers New York; 4 West 14th St., New York; 76 Dearborn St., Chicago.

OVER 15,000 IN USE.

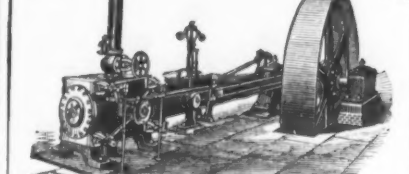


SCHLEICHER, SCHUMM & CO., N. E. Cor. 33d and Walnut Streets, PHILADELPHIA, 214 Randolph Street, CHICAGO.

Machinery, &c.

CORLISS ENGINE BUILDERS

"ECONOMY & DURABILITY"



MACHINISTS IRON FOUNDERS BOILER MAKERS
ROBT WETHERILL & Co.
CHESTER, PA.

Stow Flexible Shaft Co., Limited,

15th & Pennsylvania Ave.,

PHILA., PA.,

Manufacturers of

PORTABLE DRILLING,

TAPPING, REAMING

& BORING MACHINES

Also, Tools for Emery Wheel

Grinding, Metal and Wood Pol-

ishing, Cattle Brushing and

Clipping, &c.

Gen'l European

Agents,

Billing & Lowe,

2 Lawrence

Pontney Hill,

LONDON, ENG.

PHILA. SHAFTING WORKS,

GEO. V. CRESSON,

18th & Hamilton Sts.,

PHILA.

SHAFTING

A SPECIALTY.

Manufacturers of

Shafting, Pulleys and

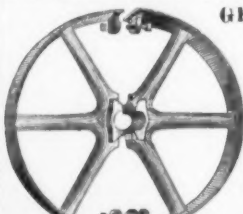
Hangers, Couplings

and every appur-

tance used in the

Transmission of

Steam Power.



SCHNEIDER'S

PAT. LEVER

MONKEY WRENCH.

Neat, Strong, Durable, Cheap.

Instantly adjusted and instantly

removed, light and convenient in

handling, simple and well made.

We desire to call special atten-

tion to the following points:

1. It is instantly adjusted—in less

than a second's time.

2. There is no thread to strip or to

become clogged and immovable

under rough usage.

These features alone should com-

ment this wrench to all workmen;

but we wish to attract the buyer's

notice to one more point, prac-

ticable only with this wrench.

All pieces being numbered, they

can be renewed at trifling cost by

ordering direct from the factory.

This wrench, therefore, is more

lasting than any screw wrench,

which becomes useless when any

part is broken. Liberal discount

to the Trade. Made only by



SCHNEIDER & CO.,

P. O. Box 655, Hamilton, O.

Agents wanted.

"OTTO"

Gas Engine.

25 to 75 per cent. less gas consumption than ANY other Engine.

TWIN ENGINES.

Impulse every Revolution.

Engines & Pumps

COMBINED.

For Hydraulic Elevators, Town Water Supply or Rail-way Service.

SPECIAL ENGINES

FOR

Electric Light Work.

N. E. Cor. 33d and Walnut Streets, PHILADELPHIA.

214 Randolph Street, CHICAGO.

DICKSON MANUFACTURING CO.
MAKERS OF CABLE MACHINERY FOR NEW YORK & BROOKLYN BRIDGE
NEW YORK OFFICE: 112 LIBERTY ST.
GENERAL OFFICE: SCRANTON, PA.
LOCOMOTIVES FOR ALL KINDS OF SERVICE
BLAST ENGINES FOR IRON & STEEL WORKS
BESSEMER STEEL PLANT MACHINERY
DERRICK & WRECKING CARS
SPRING PLATE STEEL TIED CAR WHEELS. CAST CAR WHEELS, MINE CAR WHEELS.
STATIONARY ENGINES, HORIZONTAL & VERTICAL, SINGLE & IN PAIRS.
HIGH PRESSURE, CONDENSING & COMPOUND, HOISTING ENGINES.
CARRIAGES, DRUMS & MACHINERY.
COLLIERY MACHINERY.
COAL & PHOSPHATE BREAKERS WITH PATENT REMOVABLE STEEL TEETH.
SCREENS & VENTILATING FANS.
PUMPING ENGINES OF HIGH DUTY TYPES.
CORNISH PUMPING ENGINES, PUMPS, VALVES.
BOILERS OF EVERY KIND & SIZE.
HANGERS, SHAFTING & PULLEYS.
GEARS BOTH CAST & CUT.
HEAVY MACHINERY OF ALL KINDS.
SOLE AMERICAN BUILDERS OF THE STOCKPORT GAS ENGINE, AND THE LIGHTFOOT DRY AIR REFRIGERATING ENGINE.
H. M. BOILES, PREST. & W. H. PERKINS, SECY & TREAS. S. BRADBENT CENT. SUPT. G. W. WATTS, M. E. D. LEAVITT JR. D. M. E. CONSULTING ENGR. GEO. B. ROSS AGENT IN N. Y.

TUBAL SMELTING WORKS

760 and 762 Broad Street - - PHILADELPHIA.

PAUL S. REEVES,

MANUFACTURER OF

Genuine Babbitt Metal

AND ALL GRADES OF

ANTI-FRICTION METALS.

ESTABLISHED:

Spring Making, 1842

Steel Making, 1845.

Norway Iron, 1871 (Re-Rolled).

WM. & HARVEY ROWLAND,

MANUFACTURERS OF

Springs, Steel, Re-Rolled Norway
Iron & Slit Norway Nail Rods.

ADDRESS:

FRANKFORD P. O., PHILADELPHIA.

EAGLE FILE WORKS.

ESTABLISHED 1857.

Madden & Cockayne File Co.,

MANUFACTURERS OF THE OLD AND WELL-KNOWN

"WHEELER, MADDEN & CLEMSON"

BRAND OF

FILES.

Middletown, Orange Co.,

New York.

Buyers who appreciate the highest class of goods will do well to give this brand a trial.

EXTRA SUPERIOR CAST TOOL STEEL	LENG'S IMPROVED LEVER AND CAMGATE	QUICK OPENING VALVE	WELDLESS COLD DRAWN STEEL TUBES
JOHN S. LENG, 4 FLETCHER ST NEW YORK			

PITTSBURGH STEEL CASTING CO.,

26TH AND RAILROAD STS., PITTSBURGH, PA.

MANUFACTURERS OF

Refined Bessemer Steel; Improved Steel Castings

UNDER HAINSWORTH'S PATENTS.

We are now prepared to fill orders for refined BESSEMER BILLETS or BLOOMS of any desired carbon and a uniform quality.

We would call attention of consumers to the fact that we use good material, and produce a steel pronounced by competent judges equal to the best English or German spring and soft steels.

Having had twelve years' experience in the making of STEEL CASTINGS, we are able to refer to our customers in all parts of the United States and Canada as to the quality of our work in this line. We make castings of steel practically free from blow-holes, as soft and easily worked as wrought iron, yet stiff, strong and durable, with a tensile strength of not less than 65,000 pounds to the square inch. In short, our castings unite the qualities of steel and wrought iron.

Wheels, Pinions, Cranks, Dies, Hammer Heads, Engines and Machinery Castings of all descriptions, Railroad Frogs and Crossings, Plowshares, Moldboards and Landslides.

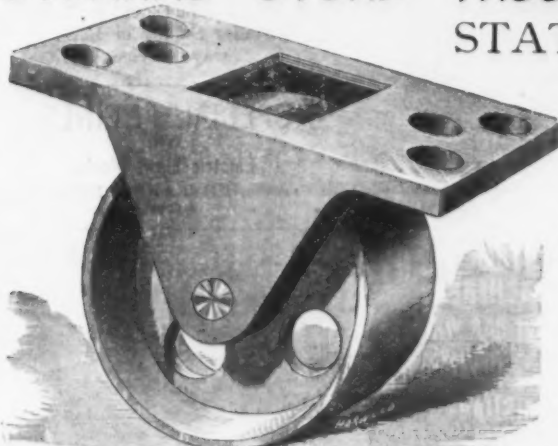
Special attention given to Heavy Castings. We use no cast-iron in our Castings. Send for circular.

POP HAMMERS.

Punching Presses,
DIES AND OTHER TOOLS
FOR THE MANUFACTURE OF ALL KINDS OF
SHEET METAL GOODS,
DROP FORGINGS, &c.
Stiles & Parker Press Co.,
MIDDLETOWN CONN.

Branch Factory and Office, 59 DUANE STREET, NEW YORK.

STEARNS' STORE TRUCK CASTER,
STATIONARY



No. 50.
5-in. Wheel, 1½ in. Wide.
Each, \$1.05.

Extra Heavy
No. 60.
5-in. Wheel, 1½ in. Wide.
Each, \$1.50.

MANUFACTURED BY

E. C. STEARNS & CO., Syracuse, N. Y.

BRADLEY'S UPRIGHT CUSHIONED HELVE HAMMER

Established 1842.

Combines all the best elements essential in a first-class Hammer.

Has more good points, does more and better work and costs less for repairs than any other Hammer in the World.

BRADLEY & CO. Syracuse, N. Y.

BRADLEY'S HEATING FORGES.

ESTABLISHED 1862.

For Hard Coal or Coke. Indispensable in all shops to keep Bradley's Cushioned Hammers and men fully employed and reduces cost of production.

BRADLEY & CO. Syracuse, N. Y.

STANLEY G. FLAGG & CO.,

PHILADELPHIA, PA.

Office and Works,
N. W. Cor. 19th St. and Pennsylvania Ave.

MANUFACTURERS OF

STEEL CASTINGS.

A Substitute for Steel and Wrought Forgings.
Circulars Sent on Application.

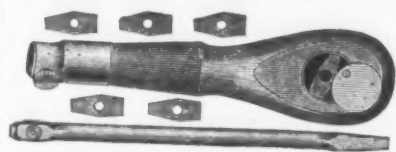
STEEL CASTINGS

Railroad and Machine Castings,
up to 10 tons. Locomotive Cross
Heads and Gearing a Specialty.

Eureka Cast Steel Co.,
307 Walnut St., PHILADELPHIA.

PRATT'S

Multiform Screw Driver.



Twelve screw drivers in one. The points, as seen in the cut, are of various widths and thicknesses to fit all size screws. They are held in the stock by a screw. This screw may be turned by one of the points held in the fingers. These points operate much better than an ordinary driver, as they are not ground to a bevel. The bit can readily be taken out of the handle and used in a bit brace.

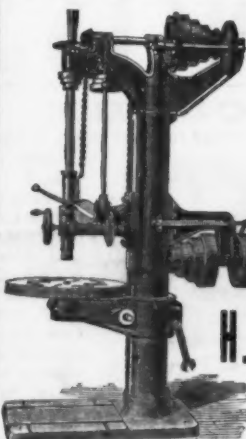
Handle, polished rosewood, 7 inches long.

Bit ¾ round steel, 7 inches long.

It is the most useful and beautiful screw driver which was ever put on the market. Price by mail, prepaid, \$1. Hardware dealers will furnish it at same price.

MILLERS FALLS CO.,

74 Chambers St., New York.

Boring
AND
Turning
Mills48 & 72 in. Swing.
UPRIGHT
DRILLS
ALL SIZES.H. BICKFORD,
CINCINNATI,
OHIO.

COLUMBIA BICYCLES

THE POPULAR STEEDS
OF TODAY

COLUMBIA TRICYCLES

FOR LADIES
AND
GENTLEMEN

ILLUSTRATED CATALOGUE
SENT FREE.

THE POPE MFG. CO.
597 WASHINGTON STREET,
BRANCH HOUSES
12 WARREN ST. NEW YORK BOSTON
15 WABASH AVE. CHICAGO MASS.

ANNOUNCEMENT.

The Clayton Air Compressor Works, of Brooklyn, have opened an office at No. 43 Dey Street, New York, for the sale of the Clayton Improved Air Compressors, Rock Drills, Mine Pumps, Hoisting Engines, Rock Crushers, Blasting Batteries, Wire, Fuse, and Mining Machinery in General. For Catalogue—August 1885—estimates and general information call upon or address,

Clayton Air Compressor Works,
Office, 43 Dey Street, New York.

(From the Engineering and Mining Journal, Aug. 8, 1885.)

The Clayton Air Compressor Works have issued a New Illustrated Catalogue and Price List. Every Mine Manager and Engineer should have a copy for reference, for none can afford to be without the information there given concerning the unsurpassed Clayton Air Compressors and other Machinery.



A. G. PECK & CO.

Cohoes, N. Y.,

MANUFACTURERS OF

AXES, ADZES,
BROAD AXES,
HATCHETS.

Send for Catalogue and Price List.

SCRANTON BRASS & FILE WORKS.

J. M. EVERHART,

Manufacturer of

BRASS WORK

For Water, Gas and Steam.

Exhaust Steam Injector, using waste Steam only, returning it to Boiler with water at 120 degrees.

Also PATENT

CUT FILES

Scranton, Pa.

RUSSELL, BURDSALL & WARD

PORTCHESTER, N. Y.,

MANUFACTURERS OF

CARRIAGE,
TIRE,

BOLTS

PLOW,
STOVE, &c.

Carriage Bolts made from Best Square Iron a Specialty.

F. W. WURSTER,
IRON FOUNDRY
AND AXLE WORKS,
130 to 142 First St.,
Brooklyn, N. Y.

AXLES

SUPERIOR
WAGON, CART AND
CARRIAGE AXLES.

Our facilities enable us to quote the trade lower prices than any other manufactory. Send for price list.

FOOT-POWER SCROLL SAWS.

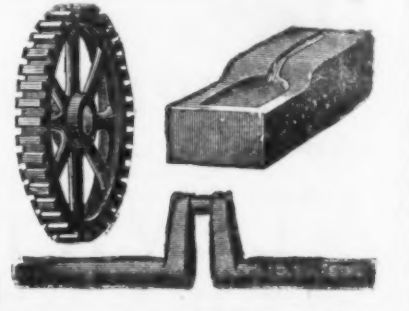


For the Workshop or Amateur.

MANUFACTURED BY

SENECA FALLS MFG. CO., 255 Water St., Seneca Falls, N. Y.

**SOLID
STEEL
CASTINGS,**



FROM CRUCIBLE and OPEN HEARTH.

HYDRAULIC CYLINDERS AND GEARING SPECIALTIES.

CUN METAL ROLLS, PINIONS and CASTINGS.

AIR-FURNACE REFINED MALLEABLE CASTINGS.

All Stock used by us is subject to Chemical Analysis in our own Laboratory.

ISAAC C. JOHNSON & CO.,

Established 1853.

SPUYTEN DUYVIL, NEW YORK CITY.

GLENN'S Patent Balanced

Hydraulic and Steam Valves.

For Controlling Machinery on Men of War, Ship Board, Docks, Elevators,
Rolling Mills and Steel Mills, &c.

For additional information and prices address

J. S. GLENN Manufacturer, 115 Fremont St., Chicago, Ill.

BEAUDRY'S
UPRIGHT
CUSHIONED
HAMMER.

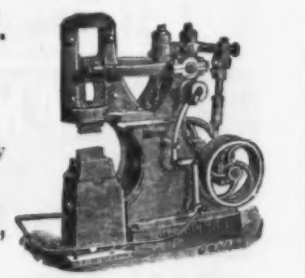
NO SHAKY WOODEN HELVE.

Springs of Best Rubber.

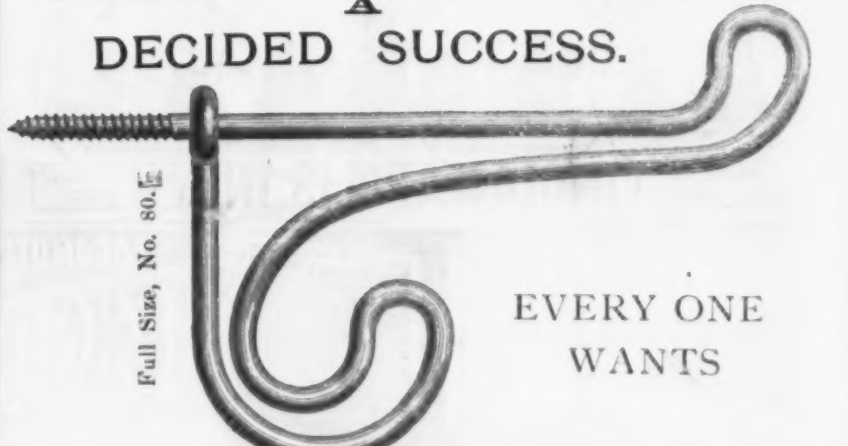
Will reduce the expenses of any shop.

BEAUDRY & CUNNINGHAM,

80 Mason Building, BOSTON, MASS.



DECIDED SUCCESS.

EVERY ONE
WANTS

Gem Wire Coat and Hat Hooks,

BECAUSE { They are Strong and Durable,
Easily put up, and
Reasonable in Price.

Four Sizes: 2, 2½, 3 and 3½ inch.

Made of Steel and Brass Wire.

Send for Catalogue of the above and a full line of Spring Hinges and Door Springs for all kinds of Doors.

VAN WAGONER & WILLIAMS CO.,

82 Beekman Street, New York.